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[OFFICIAL.]

Wanted by the Western Gas Association: A Man to Supervise the Association's Exhibit at the St. Louis World's Fair.

WESTERN GAS ASSOCIATION, OFFICE OF THE PRESIDENT,
1004 PENNSYLVANIA BUILDING,
PHILADELPHIA, PA., March 18, 1904.

The Western Gas Association desires to arrange with a suitable man to take charge of its technical exhibit of the gas industry in St. Louis during the 7 months' period of the Louisiana Purchase International Exposition, beginning May 1st. A young man familiar with gas practice is preferred, who will assume the responsible charge of the exhibits, explain such to visitors, caring for lamps and burners, operate the models, etc., etc. The time involved will be that of usual business hours, excluding Sundays. An attendant, for cleaning, etc., will be supplied by the Association. It is felt that such a position will be one of advantage and interest to whoever may hold it. Applications for such are requested immediately, and should be addressed to

F. H. SHELTON, President, Western Gas Association,
1004 Pennsylvania Building, Philadelphia, Pa.

BRIEFLY TOLD.

THE OHIO ASSOCIATION'S TWENTIETH MEETING.—Concluding our references to the last meeting of the Ohio Gas Light Association, which references were made a week ago, it only remains to be said that the closing times of the sessions were as formidable and lengthy as were those that we reported. Thursday night the members enjoyed a visit to the play at the Empire Theater, at the invitation of the local Committee of Arrangements. Friday the Question Box contents were debated, and Editor Doherty had both quantity and quality for presentation. The officers elected were:

President—F. W. Stone, Ashtabula, O.
Vice-President—Donald McDonald, Louisville, Ky.
Secretary and Treasurer—T. C. Jones, Delaware, O.
Executive Committee—C. R. Faben, Jr., Paul Doty and W. H. Barthold.

Mr. H. L. Doherty was re-elected Editor of the Question Box, and Mr. Irvin Butterworth was named to succeed himself as Editor of the Progress Department. Pittsburg, Pa., was named as the next meeting place, which rather goes to show that the Ohio Association doesn't care to be confined geographically. The meeting was a well conducted and successful one.

THE NINETEENTH ANNUAL REPORT OF THE MASSACHUSETTS COMMISSION.—"The Nineteenth Annual Report of the Board of Gas and Electric Light Commissioners, of the Commonwealth of Massachusetts, is at hand. The present volume, like all of its predecessors, is full of interesting statistics, an inkling respecting which was given in short mention of its contents in our issue for last week. This volume is, however, particularly interesting. It may be remembered that the preceding year the Board pointed out the undesirable complications arising from the fact that numerous gas companies were operating practically in the same field in and around the city of Boston, and the kind of legislation which would be beneficial to all concerned was more than hinted. In the appendix to the current volume is given the text of 'An Act to Provide for the Consolidation of Certain Gas Companies in the City of Boston and Vicinity,' which was approved June 10th, 1903, and which

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appears to have met in a way all of the questions and to have solved the problem in the most advantageous manner for the proprietors and the people in general. That and the succeeding chapters are worth careful study and preservation by all who may have similar issues to meet. Another item of much interest—especially to New York city gas, electric light or street railway companies—is 'An Act Relative to Public Service Corporations and their Employees,' which will be found on page clxxx., of the volume. The writer knows, from a personal experience in the city of New York embracing a period of over 10 years, how detrimental 'Politics' can become to the true interest of workingmen, who suppose themselves to be benefited by a system, where 'Pull' is required to procure even the humble privilege, sometimes, of sweeping up a stable or other equally unpretentious and ill paid labor; not to mention the high rank of a street car conductor or motorman. The writer has known of State Senators and Congressmen calling in person to have some poor fellow appointed to the privilege of earning an honest living at really very hard labor, but for which positions the applicants were more numerous than the jobs. And those in position to employ labor in New York city know how very hard they were pressed sometimes to meet a request which policy—if nothing else—made it very difficult to ignore. This subject affords sufficient matter for an article, but I will now only say, that if the Massachusetts law mentioned was also made a law in the State of New York, it would relieve politicians and employers immensely, and contribute in a large degree to at least compulsory self-respect of the laboring men, who sometimes cannot appear to help themselves in any other way than to apply to some noted, or notorious, politician—as the case may be—to 'use his influence' in procuring him (the workingman) the poor privilege to earn a precarious living by very hard work. The law referred to was approved May 5, 1903, and provides that 'a fine of not less than $50, or more than $100, *for each offence*' shall be levied against offenders. The three selections mentioned from this 19th Annual Report would alone make the volume worth a price, if it could be procured by purchase at book stores. All of us should extend our compliments to President F. E. Barker and his associates for the good work they are keeping up.—E."

NOTES——

MR. E. G. DUNLAP has been appointed to take charge of the collecting division of the Youngstown (O.) Consolidated Gas and Electric Company. He succeeds Mr. George Bruce, resigned.

CERTAIN New York speculators have applied to the authorities of Waycross, Ga , for the right to there construct and operate a gas plant. The promoters estimate that the sum needed to carry out their tentative plans will not exceed $75,000. We should and do say that that sum ought to be ample for the placing in Waycross of a gas plant that would be up to the needs of its residents for 40 years or more.

"M. E. H.," WRITING from Bangor, Me., under date of the 19th inst., incloses the following: "Monday night last the employees of the Bangor Gas Light Company informally but very pleasantly opened their handsome new club rooms in Exchange street. A musical programme, with banjo selections by Messrs. Libby and Stark and excerpts from the repertoire of a giant phonograph loaned by Capt. Ellis, of Brewer, occupied the early part of the evening, after which light refreshments were served and the time was passed socially. Many ladies were in attendance, relatives and friends of the members of the club. No brighter, more attractive or comfortable apartments than these new club rooms are to be found in the city. They comprise drawing, reception and card rooms, all simply but tastefully furnished, a commodious kitchen, and, last but not least, a very genuine novelty indeed—a real, metropolitan roof garden upon the flat top of an adjoining building, with room enough to play baseball in if one wanted to, and commanding a fine view of Kenduskeag stream and of the Penobscot river beyond. Possibly a 'roof garden' can hardly be referred to as a club room, but—well, it seems destined to become much more popular than any ordinary club room, when the summer days arrive."

THE Cincinnati Gas and Electric Company has arranged for an extended series of illustrated "talks" on the values of cooking by gas. The demonstration will likely be carried on in the Company's spacious offices, and the expert who will direct the demonstration is Mrs. Elizabeth Haller, of Chicago.

MR. EDWARD FEENEY, veteran street foreman for the Portland (Me.) Gas Company, died suddenly in Portland some days ago. He was in his 60th year.

THE Chattanooga (Tenn.) Gas Light Company has arranged to extend its mains to the outlying district known as Highland Park.

A BILL is before the Ohio Legislature to abolish the gas plant heretofore maintained in Columbus for the convenience and use of the State Penitentiary.

[OFFICIAL REPORT—REVISED BY THE SECRETARY.—Continued from page 447.]

THIRTY-FOURTH ANNUAL MEETING OF THE NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.

HELD IN YOUNG'S HOTEL, BOSTON, MASS., FEB. 18TH AND 19TH, 1904.

FIRST DAY, FEB. 18—AFTERNOON SESSION.

ANOTHER TRY AT THE QUESTION BOX.

The President—I will again ask your attention to some of the queries in the Question Box. The next one is:

"What co-operative, mutual benefit, or profit sharing schemes have been tried by New England Gas Companies? Upon what lines and with what success?"

Has anyone any information on that? [No response.] Here is another:

"Is there any standard size of service pipe?"

I believe that question was discussed quite thoroughly in a former meeting of the Association. If gentlemen would like to have that and much other information the volumes are in the hands of the Secretary here. While the Secretary is finding the reference we will proceed to the next question:

"Depth of material in purifiers?"

Perhaps we can get at that better by asking what is the deepest bed (single layer of material) that anyone has in a purifier in active service, of oxide of iron or iron sponge. Has anyone a layer 2 feet deep?

A Member—Yes.

The President—Has anyone a layer 3 feet deep—a single layer, without an open space?

A Member—Three.

The President—Has anyone a layer 4 feet deep?

A Member—Yes.

The President—Five feet?

A Member—Yes.

The President—Six? Well; 5 feet is the limit.

Col. Richardson—5½ feet.

The President—What is the deepest layer of lime anyone has? What is the deepest layer you have, Mr. Norris?

Mr. Norris—I have not any.

The President—What is the deepest layer of lime that anyone has? Six inches?

Mr. W. A. Learned—One foot.

The President—Has anyone more than 12 inches? Is that clear lime, Mr. Learned, or mixed with shavings?

Mr. W. A. Learned—Mixed with shavings.

The President—I don't suppose this inquirer wants to know anything about the minimum depth of material.

Mr. Norris—If I may interrupt, possibly we might get it a little better by bringing out the best depth, not what is the maximum depth that is being used. Speaking generally, my own judgment is that about 30 inches under ordinary conditions is the maximum desirable depth of oxide. If you get much deeper than that there is a tendency for the oxide to settle away from the sides. Of course, that can be partially taken care of by careful packing; but where we have boxes that are sufficiently deep to require more oxide in one box than about 30 inches to 3 feet, we generally put in an extra set of trays, dividing the oxide into two or three layers. It is possible, and as Mr. Richardson has said it is not unusual, to carry oxide deeper than that, but in our own practice we find it undesirable to go beyond about 30 inches.

Mr. Barnum—In connection with that I would like to ask what portion of the pressure of the exhausters they allow for the purifiers. For instance, if you say you will not go any higher than 18 inches back pressure at the exhauster, if you can help it, what proportion of 18 inches will you allow in the purifying house before you change the box?

The President—Mr. Fowler, can you inform us on this?

Mr. Fowler—I don't practically see much point to such a question. There are various places in the apparatus, of course, where stoppages can occur. Personally, running as I have of late years a tar washer, which requires a certain back pressure, I have endeavored to keep the pressure down in the ammonia scrubber, and on any show of more than what seems to me a reasonable back pressure from the purifiers I have had them changed. That is, if the purifiers when free would take, say, 2 or 3 inches pressure, if that pressure ran up to 6 in the purifiers alone I should have them changed.

Mr. W. A. Learned—How many of the gentlemen present are re-

versing on their purifiers? There is a really important question which has not been discussed here.

The President—I presume you mean using the ordinary purifier and reversing the flow.

Mr. W. A Learned—Yes; by what might be known as the Chollar system. I think Mr. Woodward, of Pittsfield, can give us some information bearing on that point.

Mr. Woodward—I don't know that I can give you very much information, except that we have been doing this for about a year. Our purifiers are very large for our make. We changed purifiers, I find, 3 times this last year. We do reverse, sometimes once in 3 days, sometimes once a week. That is our method of operation. We have only 2 purifiers. It does do this: The purified gas cleans up the dirty box.

Col. Richardson—We reverse, but there are 2 layers in an 11-foot 6-inch purifier. The gas enters from the top and bottom and goes out at the center, or enters in the center and goes out through the top and bottom. There is a pipe through each layer each way. There is a system of valves. But our purification plant is very large to our make.

The President—What is your own experience, Mr. Learned?

Mr. W. A. Learned—I do not reverse.

Mr. Norcross—Will these gentlemen say how long they use a bushel of oxide in purification by that method, so that we can get some idea whether they do better or worse than the rest of us?

The President—Have you had any oxide in use so long as to be worn out, Mr. Woodward?

Mr. Norcross—I mean between changes.

Mr. Woodward—We changed a purifier last May, and next in November, and in that time we passed perhaps 36,000,000 cubic feet through one box, which contained 1,200 bushels. That will give you a little data. But perhaps I did not answer the question as I should answer Mr. Learned, if he means the reversal of the flow of gas through the boxes. We don't reverse the flow; that is, we have no method of first putting gas through from the top to the bottom or from the bottom to the top. We do simply what anybody can do with two boxes. We first put it into one box, then into the second one, and after 3 days we put it into the second one and it follows through the first one.

Mr. Norris—I happen to have had access to the result of some experiments in the preparation of a paper to be given at the next meeting of the American Gas Light Association on purification, and one of the experiments covered this very point of the effect of reversing the flow. While my figures are incomplete, as far as they go, when no oxygen is used with the gas there seems to be no increase in efficiency at all due to the reversal of the flow. These experiments are to go on and have gone on all this time with the use of oxygen; but without the use of oxygen there seems to be no effect. With the use of oxygen the evidence seems to be that you can purify an additional amount of gas by reversing the flow of gas; that is boxes which you would otherwise have to change, by reversing the flow in using oxygen with your gas, you can have those boxes go on for some little time longer.

Mr. Barnum—I would like to ask Mr. Norris if that is the case, whether the rate is slow or fast.

Mr. Norris—In the case of these experiments I mentioned the area of the box was on a factor of 4-tenths, and coal gas was being purified; that is, 4-tenths of the daily make in thousands gave the area of one box in a series of 4, of which 3 were in operation.

Mr. Ramsdell—I would like to ask Mr. Norris if the addition of the oxygen would not have given the same results in the box without reversing the flow as it did in the box where the flow was reversed?

Mr. Norris—I am not sure, and that is one of the things this experiment intended in part to bring out; but it has not gone that far. I perhaps ought not to have mentioned it, because it is incomplete. But, as I say, with no oxygen the reversal of the gas does not seem to clean the purifiers up, but with oxygen the testimony of other people seems to be that it does.

The President—If the member who asked that question has not had it satisfactorily answered I hope he will say so. Returning to the question of the standard size of service pipe, I find that what I had in mind was on page 48 of the Volume for 1902-1903 of the "Proceedings," which gives the scale for house pipe, the standards in the cities of Boston and Hartford, so that I was in error about the reference.

Mr. Gould—I have a little recent data that perhaps bears upon the subject of the sizes of service pipe, through comparing the results in three adjacent companies the past month in passing through the very strenuous season with frost. In one company we had a complaint of a frozen service for every 7 services, the second company had one in 38 and the third had one in 40. All house services that had been laid for the second and third companies for about 10 years have been at least 1¼ inches diameter, and a systematic rule has been in force of relaying all old services, that have given serious trouble from frost, during the following summer. In the first mentioned company, 1¼-inch services have been laid instead of 1¼ inch during recent years, and there are many smaller services still in use that are smaller than 1¼ inches. This is not conclusive proof that 1¼-inch services are the proper standard, but would indicate that this size is a decided improvement over smaller sizes in avoiding complaints from stoppages.

The President—Mr. Africa, will you tell us how it is in a colder district? What is the smallest sized service that you put in?

Mr. Africa—The smallest sized service we have is 1 inch, and with 6,000 meters in use we have, during the coldest weather, 15 to 18 complaints a day—in the very worst weather the thermometer registered 33° below.

The Secretary—The smallest I have run across was one-half inch tap supplying 6 houses. I would say that it has not been in use during this last cold snap.

The President—The question is asked as to the use of gas for cremation. That has been satisfactorily carried on in England. Mr. Norcross, do you know anything about that?

Mr. Norcross—I do not. I know it is done, but I have not experienced it.

The President—Another question is:

"What have been the permanent effects of the coal famine of 1902?"

That is rather a large subject. Does anyone wish to give a specific reply to that question? No. Further:

"How does Texas oil behave in the New England climate?"

Capt. White—Gentlemen, this is a very critical point for us to study. Every man who is enriching coal gas with Texas gas oil, or is making water gas with it, has got to get a new phase of his education. There possibly is a point at which this oil can be converted into a fixed gas that will stand ordinary winter temperatures, but if that is so I have not found anybody yet who has discovered it. I have talked to men who have all kinds of theories on the condition of heats in the generator, and theories as to what the carburetter should do, and again other theories as to what the superheater should do; but I have not been able to find two men that had the same opinion; but I have been able to find that everybody was agreed to the fact that, so far as he had gone, he had not been able to make his gas so that it certainly would stand these extremely low temperatures. The consequence is that there is, as I said in starting, a very important problem. If any gentleman in the meeting here has evolved an answer to that problem, to his satisfaction, he really will be doing a great benefit in telling us what he has discovered. It is fair to say that a number of men are working at this question. Of course, it applies more pressingly to us men here in the North. The South, having the ordinary Southern temperatures, does not have to face this question. But, of course, an oil of the extreme low gravity which you now get, ranging anywhere from 26 to 29, and of an asphalt base, is an entirely different proposition for the gas made from the oils of Pennsylvania and West Virginia, which we have been in the habit of using, and of much higher gravity. Whether increasing heats in the generator and holding the carburetter at simply the heat which the blast would give it in passing through the generator first—I mean no additional blast—and whether holding the carburetter in that relation to the heat and putting extra blast into the superheater, so that it will be extremely hot, reaches this question, is a matter for experiment. I have heard all kinds of answers made as to depth of fuel in the generator, character of blast and length of run, but I am yet unable to find a single man who will say, "Eureka, the secret is found," in handling these heavy Texas gas oils.

The President—Whoever asked that question was particularly fortunate, and received a whole cornucopia of wit and wisdom. Has anyone been successful in handling this oil?

The Secretary—Mr. President, I will put another question alongside of it, by asking if those who have been using cannel for enriching their gas have had any better luck in having their candle power withstand the low temperature?

Capt. White—Mr. President, I might reply to that while saying what I intended, but left out. We had a very interesting paper at our last meeting of the Society of Gas Lighting, from a very careful member. He made a number of experiments on candle power with absolutely straight coal gas, coal gas enriched with this same oil, and the absolutely clear oil gas, in travelling distances of 84 miles, and the result of those experiments was that the clear coal gas enriched with cannel had far greater resisting power to the cold than any of the others.

The mixture of coal and oil enriched gas was next, and the least resisting power was given by the clear water gases. Of course, that might not be true of the gas mixed with naphtha or the old Pennsylvania oil, but it was true through a series of experiments that the first, by a very large percentage, was coal gas, purely coal gas, the next was the coal gas with the oil enrichment, and last of all, and far last, was the water gas. Coal gas mixed with cannel was the first, and largely first.

The President—Perhaps we might get a little more definite answer to this question if we could find out the percentage of the oil as tar, including as tar all the light oils which are thrown down in the gas; in other words what percentage of the Texas oil that you put into the carburetter is removed from the gas system as tar or drip. Has any one made any measurements on that? Have you, Mr. Learned?

Mr. W. A. Learned—No, sir.

The President—Have you, Mr. Nute?

Mr. Nute—No, sir.

The President—Has any one? Mr. Barnum, have you?

Mr. Barnum—Our general average would be about 8 per cent. condensation from the generator to the relief holder, 4 per cent. from the relief holder to the purifier, making a total of 12 per cent. of oil of the gravity of 34, which distils say 10 per cent. oil at 150° C., 40 per cent. at 300, and 50 per cent. over 300° C.

The President—Do you know what is thrown down beyond the purifiers?

Mr. Barnum—None.

The President—That makes 12 per cent., and there is none beyond that point?

Mr. Barnum—No, sir.

Mr. W. A. Learned—Have you used Texas oil, Mr. Barnum?

Mr. Barnum—No, I have not.

Mr. Coggeshall—I would state, Mr. President, that our Company is using Texas oil. We are making strictly coal gas. I have not used it long enough to form a very definite opinion upon it, but I have seen no depreciation in the candle power in this extreme cold weather. We reserve a retort especially for that purpose. The other retorts make strictly coal gas.

The President—"How much sulphur is being furnished New England Companies in their coal?"

A Member—Five per cent.

The President—Has anyone got under ½ per cent.? I suppose Mr. Hayward will probably have a large fund of information upon that. (No response.)

A motion to adjourn to 10 A.M. of the following day was adopted.

SECOND DAY, MORNING SESSION, FEB. 19, 1904.

The meeting was called to order, pursuant to adjournment.

The President introduced Mr. A. J. Campbell, who read the following paper, entitled the

TESTING OF INDEPENDENT WATER HEATERS,

compiled by the reader and Mr. George B. Leland of Norwich, Conn.:

Following the suggestions made by the Committee on Testing Fuel Gas Appliances of the Ohio Gas Light Association, in the report rendered at the 19th annual meeting (see AMERICAN GAS LIGHT JOURNAL, June 8th, page 889), a few tests were undertaken on the comparative efficiency of independent hot water heaters, and below is given a summary of the results obtained.

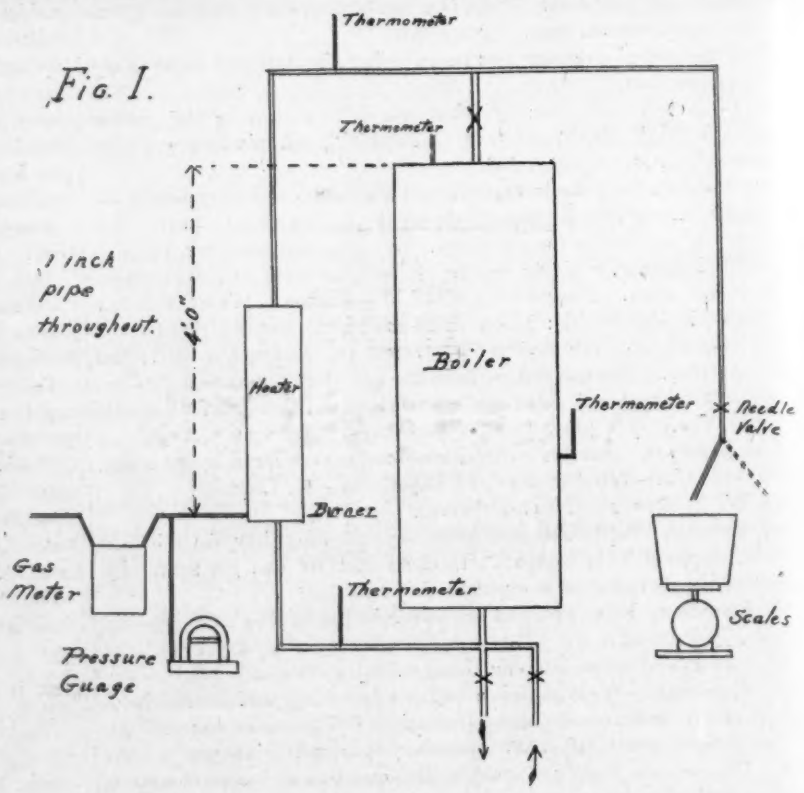
The tests were not made with the care and accuracy of laboratory work, but were largely undertaken for the purpose of finding a quick, fairly accurate and simple way of rating heaters. The general results of our experiments we have embodied in some "conclusions" at the end of the paper.

The heaters tested were the Vulcan, Eclipse and Peerless. In the tables and figures they are marked *a*, *b*, *c* and *d*, but are not in the order given above—"*b*" and "*d*" are the same make and size, but "*b*" is of brass and "*d*" is of iron, "*a*" is of copper, "*c*" of iron.

The diagram, Fig. 1, will show how the heaters were connected. The thermometers used were ordinary commercial tube thermometers and were compared with each other at ordinary temperatures,

It is very essential to have a valve with a fine adjustment on the water outlet. A needle oil valve is recommended for this purpose. One with ¼-inch maximum opening will be found amply large at ordinary pressures. A test meter or other special form should be used for the gas, to save time in reading. The gas pressure gauge should be attached near the burner and should be kept in sight to make certain that a constant pressure, and consequently a constant consumption, has been maintained.

Fig. 1.



The cocks shown on the diagram were ordinary gas cocks, but they leaked under city water pressure and valves are recommended instead. The water was measured by allowing it to discharge into a pail set on a pair of scales, and by means of a stop watch the time required to discharge 10 pounds was taken.

The boiler used was an ordinary 30-gallon kitchen boiler. No pipe covering or lagging of any kind was used, as it was thought best to reproduce as nearly as possible the conditions found in ordinary practice. The temperature of the room was between 65° and 70° F.

We found that by changing the time, the flow of gas and of the water a great many combinations were possible. Most of them, however, were useless and unnecessary, and we reduced them to two—the circulating capacity of the heaters and the comparative efficiencies, both made with a constant consumption of gas produced by maintaining a constant pressure of 20-tenths at the burner.

It may seem to some that the gas pressure should have been varied, as that is the condition most frequently met with in practice, but we found that the consumption of gas was not sufficiently changed with reasonable variations in pressure to make this worth while. The consumption varies as the square root of the pressure. Roughly, this is 12½ per cent. for 5-tenths variation above and below 20-tenths. Moreover, the heat imparted to the water is practically proportional to the gas consumed, and the efficiencies are not materially affected within the limits mentioned.

Circulating Capacity.—The circulating capacity of the heaters can be compared and considered in several different ways, but the best single standard of comparison seems to be the quantity of water the heater will cause to circulate for a given difference of temperature between the inlet and outlet, and to reduce this to gallons per hour per cubic foot of gas consumed. The results obtained by us are given in Table No. 1, and by the curves shown in Fig. No. 2. They were obtained by regulating the discharge of the water to produce the desired increase in temperature.

We have assumed that the water will circulate in the heater and boiler at the same rate as it flows from the discharge pipe for the same rise in temperature.

Another, and simple, basis of comparison is to close the discharge valve and allow the water to circulate in the heater and boiler. Thermometer readings taken every 5 minutes show the rise in temperature for given periods of time. (See Table No. 2.) Still another method is

TABLE NO. 1.

	A.				B.				C.				D.			
Increase of temperature.....	60°	68.5	80	92	62°	70°	81°	89°	59°	74°	78°	90°	60°	70°	81°	92°
Cubic feet gas per hour.....	37.5	37.5	37.5	37.5	37.2	37.2	37.5	37.5	31.5	31.5	31.5	31.5	46	46	47	47
Gallons water per hour.....	34.6	29.2	24	20.8	33 2	33.2	22.7	20.3	26.2	26.2	18.1	15.1	33.5	33.5	24	20.7
Gallons per hour per cubic feet gas.	.92	.78	.64	.55	.89	.89	.61	.54	.83	.83	.58	.48	73	.73	.51	.54

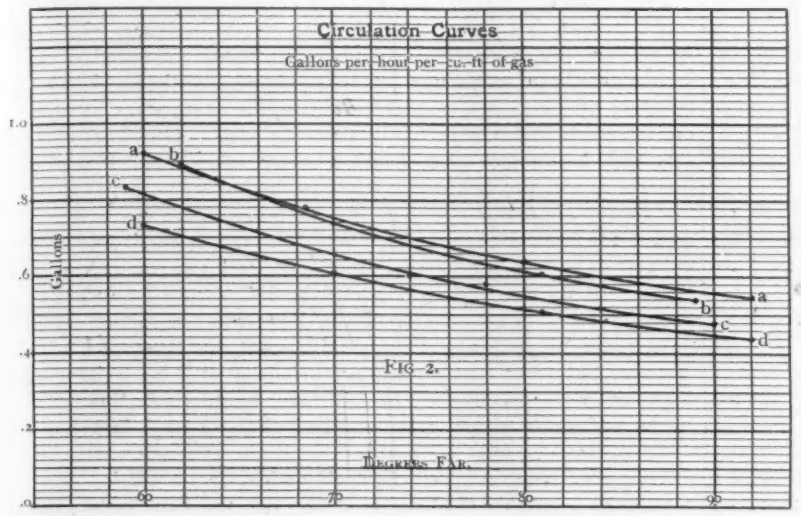


FIG. 2.

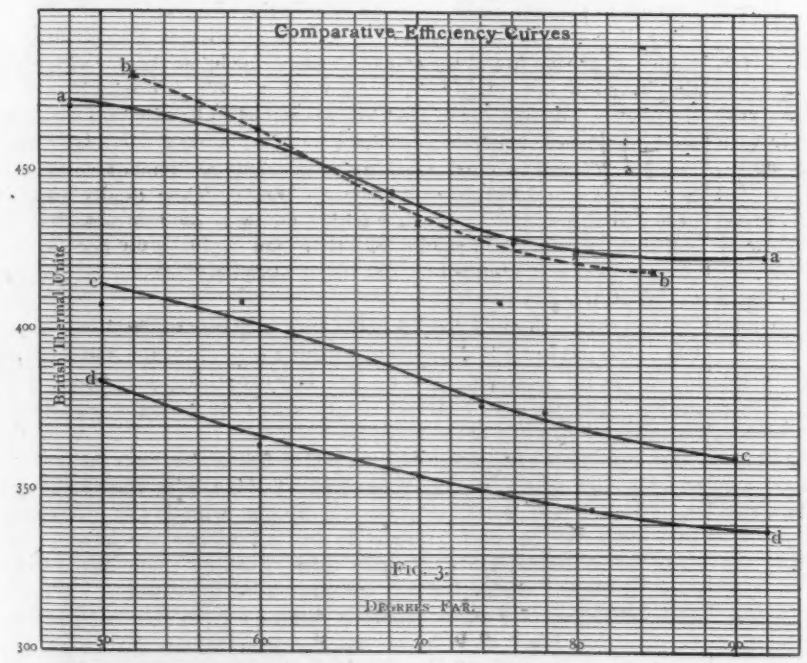


FIG. 3.

to note the time required to raise the temperature of the water in the boiler through successive increments of temperature, as shown by the thermometer in the side of the boiler. The results of this latter method, as applied to two heaters, are found in Table No. 3. It is evident that the gallons per hour cannot be obtained by the two last-mentioned methods.

TABLE NO. 2.

Elapsed Time, Minutes.	Difference Between Inlet and Outlet Water. a.	b.	c.	d.
5	51°	59°	63°	59°
10	68°	61°	74°	63°
15	70°	64°	77°	66°
20	73°	67°	81°	70°

Comparative Efficiency.—We had no means of determining the calorific value of the gas; therefore, all efficiencies are expressed in British thermal units imparted to the water, and not in per cent., as they should be. We assumed that the calorific value of the gas remained constant, and by making tests on the same heater at different times this was found roughly to be the case.

To obtain the efficiency the thermometers were allowed to settle and readings were taken. The water was discharged into a bucket and the time for the discharge of 10 pounds was noted, as was also the consumption of gas. From these the efficiencies were calculated. See curves on Fig. No. 3.

Great care should be exercised in these tests to see that the thermometers have really settled, and that no sudden or material change is made in the flow of the water or other conditions, as such changes made during a test are apt to lead to false results. It is better to work up gradually from a lower to a higher temperature than to work down.

Conclusions.—Many of these are only what are to be expected from theoretical and other considerations, and the results have only been drawn up in this form because it seemed the simplest way to give definite shape to the results of our experiments.

1. We find what we would expect, that:

a. The heat imparted to the water is practically proportional to the gas consumed.

b. The efficiency of the heaters decreases as the temperature of the outlet water increases.

c. The efficiency decreases as radiation increases, and radiation increases rapidly as the temperatures of the heater, pipes and boiler become higher than the surrounding air.

2. That iron heaters are only 80 to 85 per cent. as efficient as brass or copper heaters, and the two latter have the added advantage that rust and sediment are not so likely to decrease their efficiency with time. In commercial use there seems to us no question about the superiority of brass and copper heaters over iron.

3. That the most important efficiency tests are those made at about the circulating capacity of the heater.

4. That the circulating capacity varies and decreases as the outlet temperature increases. Therefore, the efficiencies should be taken at about the temperatures found after running the heater for 5, 10, 15 and 20 minutes. See Table No. 2. This covers the range for ordinary use.

5. There are four important considerations in the selection of a heater:

Price; circulating capacity; efficiency; construction—*i. e.*, strength; non-likelihood of leaks, and ease of cleaning.

The circulating capacity and efficiency are obtained as outlined. The construction of a heater is very important, and should be given careful consideration.

6. Excluding the instantaneous type, independent water heaters may be classed as follows:

1. Semi-instantaneous.

a. Heaters that have large, circulating capacity—but usually do not increase the temperature of the water by a large amount. Examples: Heaters "*b*" and "*d*."

TABLE NO. 3.

"B." Elapsed Time.	Outlet Temperature.	Degrees Rise at Outlet.	Temperature at Side of Boiler.	Degrees Rise on Side.	"C." Elapsed Time.	Outlet Temperature.	Degrees Rise at Outlet.	Temperature at Side of Boiler.	Degrees Rise on Side.
M. S.	..	..	..	..	M. S.	..	..	..	..
0	..	..	50°	..	0	..	..	52°	..
43—10	130°	78°	60°	10°	68	156°	102°	62°	10°
46—15	132°	80°	70°	20°	71—30	159°	105°	72°	20°
48—15	133°	81°	80°	30°	74—35	162°	108°	82°	30°
50—30	134°	82°	90°	40°	77—45	163°	109°	92°	40°
54—20	136°	84°	100°	50°	81—50	166°	112°	102°	50°
Inlet temperature, 52°. Gas pressure, 20—10. Gas per hour, 37.5 cubic feet.					Inlet temperature, 52°. Gas pressure, 20—10. Gas per hour, 31.5 cubic feet.				

b. Heaters that circulate less water but raise the temperature higher than Class "*a*." Examples: Heaters "*a*" and "*c*."

2. Heaters designed to burn continuously for many hours, but consuming only a small quantity of gas, and not designed to give hot water quickly. None of this class tested.

It is evident that a knowledge of the performances of a heater will greatly aid in the selection of the one best adapted to particular cases. Some uses may require a small quantity of water at a high temperature, but for ordinary household uses more satisfaction seems to be given by heaters that will quickly furnish a large quantity of water at a moderate temperature.

The testing of heaters as outlined is a very simple matter, and the information obtained is well worth the time and expense required. Incidentally, such tests make more evident the importance to gas companies of knowing the calorific value of their gas.

Discussion.

The President—Has any member made similar or other tests on water heaters? While this subject is under discussion, will members state how these heaters are being received; with what favor they are accepted in their several communities?

Mr. Snow—I cannot, for we have had no experience. We don't handle appliances in any way.

The Secretary—I would like to get an expression of the experience of members on the question of iron as compared with brass. We all know that the brass is better; we also know that it costs about twice as much. I have in the last year sold one or two heaters of each kind, and I believe have had no complaint from the iron heaters, though I never recommend them; but we find lots of people who, if one machine costs $2 and the other costs $1, will take the $1 machine every time. I would like to get some idea from members how much danger there is in letting them have the iron heater.

Mr. Nute—I would say that was so with the ones used in Fall River, and I understand it is pretty generally found throughout New England that the iron heater is absolutely valueless; it may be used for a very short time with a fair degree of success, but the water coming from it is very rusty. I know in our case, with hot water round the works, particularly between the feed-water pumps and the boilers, where hot water is in the piping all the time, either wrought iron or galvanized iron pipe is good for just about 11 or 12 months before it is entirely rusted out. We get the same effect exactly in the hot water heater, except it is not used as much; we get the rust in the water, and we get a heater that in 2 or 3 years, perhaps, will rust out, depending on how much it is used.

Mr. Fowler—I can say something as to how things are in Cambridge. I put in my own house, entirely independent of the gas company, which, however, helped me out with its men to do the fitting, an iron heater, and the water that came through it was often so rusty and dirty that it was impossible to use it. We had to take it out and put in a brass one. In Charlestown now I am continually changing the iron heaters that ha ve been put in.

Mr. Allyn—The Treasurer of our Company has arrived. You can say it to his face.

The President—Mr. Barnes, the subject is the testing of water heaters, and that has at present taken the direction of discussing the relative merits of iron, brass and other piping. We would like to know the experience of Cambridge, whether dependent upon the quality of the water used or upon the effect of the gas furnished, one on the outside and one on the inside of the piping.

Mr. Barnes—Mr. President, we have both in use, the galvanized iron heaters and the brass or so-called copper heaters. We have had one or two instances where the galvanized iron heater has given dirty water; but I think I am right in stating that in every instance we have found the bottom of the heater connected up below the bottom of the boiler, showing, to my mind, that the dirty water was caused by the deposit of the boiler settling at the bottom of the heater, and was not due to any rust of the galvanized iron or to the action of the heat or the water. Where those galvanized iron heaters have been connected with the bottom of the heater above the bottom of the boiler, so that the sediment of the boiler would not get into the heater, so far as I know we have had no trouble.

The President—Will you extend your remarks, Mr. Barnes, as to the general subject of installing water heaters and the favor which is accorded them in Cambridge?

Mr. Barnes—We have found them very satisfactory in almost every instance where they have been installed. I suppose you are talking of the hot water heater that is attached to the boiler.

The President—Any kind.

Mr. Barnes—Not the instantaneous water heater?

The President—That also.

Mr. Barnes—We have only installed a few of those, but we have installed a good many of what we call the independent water heaters; that is, one attached to the boiler for the purpose of heating the water, and they have given universal satisfaction. We now recommend them in place of the coil attachment to the range, as being more economical and more serviceable, giving quicker and cheaper service.

The President—Have you ever had to remove any?

Mr. Barnes—No. I have heard of one or two instances where people found them too expensive and have removed them themselves, but we have never been called upon or asked to remove them. I had an interesting incident last winter. During the stringency in the coal market a gentleman came in one morning with a gas bill of about $21, and said he thought that it was a pretty large one. I said, yes, I thought so too, and asked him what he used the gas for. He told me that he did his cooking with it, had an independent water heater and used it for lighting. I told him that I did not think it was necessary to have so large a bill as that, even if he used gas for such purposes. He said he did not think it was, and he did not think he should have another one as large as that. I saw there was something under the smile which he had, and I asked him what had happened. He said that one Saturday night, wanting to take a bath, he lighted his independent water heater, took his bath, and went to bed. Sunday morning he had plenty of hot water, and he had also a good, large gas bill.

Mr. Hintze—I would say that in Lowell our experience with the iron water heater compares very favorably with Mr. Fowler's. We have made quite a number of changes, taking out the iron heaters and putting in brass, and the same with coils in the stove—of course, without expense to the consumer, in order to hold the business.

Mr. Barnes—I would like to say in this connection I recollect an instance where we found the so-called copper or brass heater clogged so that we could not get any water through it. We brought it down to the office. The interior of that heater seemed to be filled up with some solid substance, whether carbonate or what it was of course I don't know. We had two men working on it nearly all one day clearing it out. They could not force it out with water. They finally took the heater to pieces, and by tapping with a hammer on the outside of the coil they loosened it in such a way that they could get it out piece by piece. That is the only instance that I have ever known of a copper heater giving any trouble.

Mr. Africa—In our experience the iron heaters are absolutely worthless. We put in quite a number of them a few years ago and have had to remove all of them. We do not buy anything except the brass heater. The cast iron heater is not as bad as the wrought iron, but we recommend only the brass or copper.

Mr. Scranton—In Derby we have 200 or 300 heaters out, the majority of which are iron. We don't have any trouble, with the exception of the families that don't use them during the winter. In the spring, after the water has been allowed to stay all winter, we have to take them down sometimes and clean them, flushing them out with the street pressure. Outside of that we don't have any trouble. Whether the condition of our water supply is different from that of these other gentlemen or not I don't know, but the iron heaters give very good satisfaction.

The President—Mr. Africa, will you state the quality of the water?

Mr. Africa—The water is clear, and the analysis of the water will show it is almost absolutely pure.

The President—How is it in Derby? Are they wrought iron or cast iron?

Mr. Scranton—Cast iron.

The President—Mr. Barnum, can you tell how it is in Worcester? I believe the water there is not quite what you always wish.

Mr. Barnum—I had a water heater with an iron coil and had the same experience. I used it intermittently, which allowed it to rust, and it would take 2 or 3 days to get it cleaned out, so I had it removed. I should like to ask if any company has made it a business to put in gas stoves and gas heaters in the following manner: Put in a gas stove for the summer use with a gas water heater, and then a coil in the furnace to be used during the winter. That allows a consumer to use the gas stove during the winter. Then, too, if any company makes a practice of putting in a boiler to let the water take the temperature of the cellar before it goes to the gas heater. This arrangement will make the heater give hot water very much quicker and, of course, save gas, and make the water heater an efficient and economical adjunct of the kitchen.

Mr. Scranton—In Derby the greatest trouble we have had in getting

people to discard the coal stoves was that they could not have hot water during the winter time. I suggested, and tried in my own house, running a pipe right through the furnace, dropping it down, and just making one loop about on the level of the coal door, so that the coal would not strike the pipe. I found very good results when I was running the furnace with a fair fire. When I was running it low I did not get water hot enough. I extended that loop up and back and got plenty of hot water. At the present time we have in Derby, I should think, 100 people doing that, using the gas stove all the year round and discarding the coal stove. The expense of putting that in was very small; $5 or $6. The Company did not do it; the plumbers did it. Have we put in a heater before the boiler? We have never done anything of that kind.

Mr. Price—We have been very much interested in the way of getting the right water heater, and we have now on our floor probably half a dozen different ones for trial. I would like to inquire the experience of other members who have been using a pipe heater in distinction from a lump form of heater, where the water is in some considerable quantity at a point. We have used an iron heater there for several years, and have had no trouble from it. It has been the most efficient heater that we have had, and has given very general satisfaction. The maker said that the galvanizing of the ironwork on the inside as well as the outside would result in the heaters lasting indefinitely. We took that with a great deal of allowance, but so far we have had no trouble from them. It has been a very practical heater. We are in doubt, however, as to whether the best form of heater is by using pipes or by using this lump form, and we are now trying several heaters so as to get the best, not in the scientific way, perhaps, that these have been tried, but by considering the conditions in regard to placing heaters lower than the bottom of the boiler. In our community the practice is quite general to put the boiler on the second floor in the bath room, so that heaters in the kitchen are, of course, always much below the bottom of the boiler. We have as yet had no trouble from this cause. I would like to get some one's experience in regard to the different types of heaters. We have them in spiral columns of various kinds; pipes, where the water is returned once or twice, and then the forms in disks, where the heat rays are staggered before they get out of the heater, and others. We are willing to hear all we can on the subject.

Mr. Scranton—I would like to inquire what the practice is in selling these heaters; whether they sell them for cost, or whether they sell them at a profit and put them in free?

The President—Of the members in the room how many sell these heaters at cost? Will they raise their hands? (Several hands were raised.) Will those who sell above cost raise their hands? (Two hands were raised.) Those who sell them below cost? (Two hands were raised.) Thank you, there were 22 at cost, 2 below and 2 above.

Mr. Scranton—I would like to inquire—I think I ought to have asked before—does that mean, gentlemen, the heater put up at cost, or selling the heater and putting it up free; that is, I mean the piping free?

The President—All those who voted that they put the heater in at cost I will now ask to raise their hands if that refers simply to the heater and not to the piping. (Five hands were raised.)

Mr. J. J. Humphreys, Jr.—Some of us connect the gas and do not connect the water free. I connect the gas free and so do a great many others, but not water.

Col. Richardson—At North Adams the connections to both gas and water are made free, and all apparatus is sold upon a basis of cost, with a discount of 10 per cent., if paid within a week. So that if a heater costs $10, it is connected to both water and gas free, and is sold for $9. All our apparatus is sold in that way.

Mr. Barnes—In Cambridge the practice as to the sale of water heaters is to allow the plumber to do the connecting, both of gas and water. We have no plumbers on our force, and there are a good many plumbers in Cambridge who would be disposed I think to criticize the Company if it undertook to do plumbing business. So we simply sell the water heater at cost, and the purchaser of the heater has the work done by his own plumber—both gas and water connections.

Mr. Sargent—In Lawrence we sell water heaters at cost, do the piping at cost, and the plumber does the water part. We don't bother with that at all. We have not done very much with heaters, for the simple reason that we cannot use an iron heater. We started in to use iron, but after about a year or so we had to take them all out and put in brass heaters. The expense of brass heaters seems to be too much for our consumers, but we are in hopes this summer to do more business in brass heaters, because we expect the price will be less.

The Secretary—Mr. Barnes brings up one point which, it seems to me, might be brought out, and that is as to the Cambridge professor. I would like to inquire whether anybody has an automatic thermostat attachment to these heaters, so as to let the professor go to bed and not bother about the gas. I bought one but it still lies on the shelf, so my experience is not very valuable. I have not been able to find anybody that would pay for an installation as expensive as that would be; but whether anyone has done anything at that, putting an automatic regulator on the independent water heater, so that when the professor does go to bed his bill won't run up after the boiler gets hot, and continue to run up?

A Member—I would say that in Lowell we have installed the Monarch type of heater—perhaps ten or a dozen. A gentlemen in the piping business there, who is a graduate of the Massachusetts Institute of Technology, told me a short time ago that he considers that form of hot water service the best there is.

The Secretary—That does not quite answer my question, though the Monarch heater is all right, except that the cost bars it from the district which I have the honor to serve except in three cases, one of which is the Gas Company's office. Of course, the Monarch is not a thermostat. It is regulated by turning on and off the water. A person is not very likely to leave the hot water running, but when a professor gets into the tub and gets ready to go to bed he is very likely to forget to go down to the kitchen and turn off the gas, and some others besides Cambridge professors are liable to forget it, too.

Mr. Africa—We have had a little trouble with the water heater in our show room being allowed to run all night several times, so we put a thermostat on and find it works very satisfactorily. The thermostat checks the supply of gas so that it does not overheat the boiler. This is the only one we have in use.

Mr. Leonard—Not having had time to examine these curves closely, I would ask Mr. Campbell if he will explain just what the slope of this curve on Fig. 3 means, and also the slope of the curve on Fig. 2.

Mr. Campbell—On Fig. 3 take the curve of *A*, for example. The horizontal lines represent British Thermal Units, beginning at 300 at the bottom and running up to 500, and the vertical lines represent the degrees by which the temperature of the water is increased between the inlet and the outlet. If you take the first point on *A* you will see that it is on the horizontal line representing 470 British Thermal Units, and it is on the vertical line representing 48° of temperature. Therefore, when the heater was raising the temperature of the water by 48°, there were imparted to the water 470 British Thermal Units per cubic foot of gas burned. The same will apply to the other points on the curve. So that when the water was being increased in temperature by 48°, there were 470 British Thermal Units imparted to it. On the other hand, when it was being raised—if you follow the same curve—by 92°, the last vertical line on the right hand side, there were being imparted to it 424 British Thermal Units, showing that when more heat was imparted to the water—that is, the temperature of the water was increased—the heater was not as efficient.

Mr. Leonard—Then, as I understand it, the efficiency would be expressed by dividing at, say, the point *A*, the number of British Thermal Units, say 470, by the calorific power of the gas.

Mr. Campbell—Exactly. And on the other curve, Fig. 2, the horizontal lines represent the gallons of water per cubic foot of gas, and the vertical lines again represent temperature, so, taking that same curve of *A*, when the water was increased 60° in temperature between the inlet and outlet that heater was circulating .92 of a gallon per hour per cubic foot of gas burned. Is that clear?

Mr. Leonard—Yes; and the efficiency would be expressed in percentage, how?

Mr. Campbell—That is not the efficiency; that is the circulation curve.

Mr. Leonard—Pardon me; I did not see that.

Mr. Campbell—That has nothing to do with the efficiency, simply the amount of water that that heater will cause to circulate. Likewise with other points on the curve.

Mr. Leonard—That is quite clear; thank you.

The President—Mr. Baldwin, you have had a long and varied experience with water. Can you offer any counsel as to what members can do in regard to increasing the length of life of these heaters?

Mr. Baldwin—I don't know that I can say anything especially in the way of prolonging the life of these heaters, but I can say that for a good many years I have been where water has been largely connected with my business, and I think that the individual members might perhaps get considerable information by consulting the water officials in their cities. Many of them have given a good deal of attention to the action of water on iron. Take the case of Boston, for instance. In the early days of the water works, over 50 years ago, a scientific commis-

sion was appointed to determine the action of the water on different kinds of metals, so far as they were used for service pipes, and it was found that even in passing cold water the iron was very badly affected by the water. This was followed up in later years, when they came to introduce meters, by a similar class of experiments, and it was found that meters which were made with bodies entirely of iron filled up with rust so that in 2 or 3 years they were practically worthless, and they were obliged to discard these and use only meters having bodies made entirely of composition. That has been the custom up to the present time. The same condition exists in Charlestown. Manchester, N. H., is another city which found it could not use iron with good results and abandoned its use in connection with meters. There are a good many of these places. In our experiments we found in making meters to measure hot water that those with iron bodies filled up, in practically a short space of time, and I think it is the general opinion among those conversant with the use of iron in connection with hot water that it is very short lived indeed, and that composition of some kind is far preferable.

The President—Mr. Campbell, it is gratifying to have your careful laboratory work balanced by such a general statement of the experience of consumers. Have you anything further to add?

Mr. Campbell—I should like to make one or two points on questions that have come up. In connecting a heater we used to adopt the plan of giving the consumer the choice of whether it should have a flue connection to carry off the waste gases or not. We found that where we gave the choice, and the consumer chose not to have it because it cost a little less not to have it, there was a good deal of complaint afterwards about the smell, that it was disagreeable in the kitchen or wherever the heater was located. We have since adopted the plan of not putting up a heater, not selling it, unless it is given a flue connection to carry off the waste gases, and that overcomes any trouble and complaint from disagreeable odor. There is another point in connection with the testing of the heaters that has occurred to us since writing the paper. If you stop to consider a moment you will see that the final temperature of the water that you want is pretty nearly constant; that is, about 110° to 120°. I think that would cover all household uses; 110° is water about as warm as the ordinary individual wants to put his hands into, and 120° is pretty hot; but the inlet water varies a good deal, especially between summer and winter. Now, if you have a heater that at the end of 10 minutes increases the temperature we will say 60°, and you are putting water into that heater at 40° in winter time, you will only have water that is 100° at the outlet, which is not as hot as people want. On the other hand, in the summer it would be just about right, say 60°, and another 60° added to it would be about 120°. If you have a heater we will say that at the end of 10 minutes raises the temperature of the water 80° in winter with water at 40° at the inlet, the addition of 80° would give you 120°, which is what you want; but in summer, with water at about 60°, another 80° added would give you 140°, which is hotter than you want and serves no really useful purpose. It has occurred to me that a cock or valve that would partly close—not close completely but partly—could be put into the inlet just below the heater and the consumer could then regulate the increase in temperature. The heater could be made so that it would circulate very freely, and if given the full head of water would at the end of say 10 minutes increase the temperature about 60°. That in summer time would answer very nicely. Then, if the inlet water was colder in winter time, the consumer could turn this cock and so decrease the pressure on the heater and would then get a little less water, but it would be hotter, so that the final result would be that he would again in winter time get the water at about 120°, which is what he would want. I think that would be a very simple thing to do. It seems to me impossible to make a heater that will automatically take care of that, but by simply putting in a cock that will let the water flow freely or will partly turn it off the consumer can use the same heater in summer and winter and get the same results out of it.

On motion of Mr. W. A. Learned a vote of thanks was tendered to Messrs. Campbell and Leland for their paper.

(To be Continued.)

[Revised by the Secretary.—Concluded from Page 457.]

PROCEEDINGS, ELEVENTH ANNUAL MEETING, MICHIGAN GAS ASSOCIATION.

Held in Saginaw, Mich., Feb. 17 and 18, 1904.

Second Day—Morning Session, Feb. 18.

The meeting was reconvened pursuant to adjournment, at 10 A.M. of the 18th. The President introduced Mr. A. P. Ewing, of Detroit, who read his paper on

ADVERTISING AS IT CONCERNS A GAS COMPANY.

[For the text of Mr. Ewing's paper, see Journal, Feb. 22, 1904; p. 288.]

Discussion.

Mr. Ewing—I would like to say that the "sticker" which I mentioned does not appear in the supplement, because the cut was sent to "Progressive Age" to be published at the time the paper was printed, and it was returned to my office too late for this supplement. It was the same size and form as the ordinary "coke stickers" you find on the lower page.

The President—You have listened to a very interesting paper by a man who has had a great deal of experience in this line in Detroit. I think his success in the advertising line is something he can be congratulated upon. One thing, however, Mr. Ewing, I do not quite understand: How can you make your conscience entirely easy by charging some of your advertising expenses to construction?

Mr. Ewing—I am very glad you brought that up, because I don't know of any company that charges advertising to construction. The Detroit Company, however, never had anything to do with what you might call a large coke business; that is, as far as I know. During the last few years they have been dependent upon water gas to a large extent—that is, since the natural gas was turned off the city. It came in enormous quantity when the retort house was completed, and brought about conditions where we had 50,000 tons of coke to dispose of the very first year. We didn't have an opportunity to grow up to it. The 2 years previous we made a great many enemies by not having enough coke even to supply our regular customers, and were obliged to turn them away. Now it seems rather unjust to take a proportion of $15,000 for advertising and charge it directly to the expense account. I will have to say that it was charged to the expense account, but I was very emphatic that this portion of it should go into the construction account if possible. The new classification of the McMillin Companies provides that the new business account, which is a *pro rata* one, can be charged to construction (or a portion of it) only with the consent of the directors. I do not think the directors would ever consent to any portion of it going to construction, but I rather feel in a case of this kind that it is legitimate for a given portion to go to construction. In the State of Michigan at the present time gas companies are trying to place gas house coke on a par with oven cokes; and it seems to me that the word "Genuine" to-day in Michigan is an asset. If a customer insists on having "Genuine" gas coke he cannot get "Solvay" coke; he cannot get "Hamilton" coke; he cannot get "Connellsville" coke. It is only making a distinction between the kinds of fuel. It is building up an asset. If the extras that go with the distribution department are charged to construction, why isn't it legitimate to charge a portion at least of this advertising of the new business to construction?

Mr. Eaton—I think if Mr. Ewing's company has spent $15,000 in advertising "Genuine Gas Coke," and considers it will not be necessary to spend similar sums, or as large sums, in future years to advertise coke, it would be legitimate to charge a portion of that account as expense in the following year or two; that is when the expenditure would be less. I do not think one has any right to put it into construction.

Mr. Ewing—I don't want to mislead you, Mr. Eaton. You seem to infer that we have spent this $15,000 in a very short space of time. This whole amount was to be used over a period of a year or two; and while I think we made a good showing with the coke, still it does not make a good showing with the advertising.

Mr. Eaton—There is no doubt that the surplus amount of coke that the company may have marketed may make a large coke expense. The reason you have that coke to market is because you manufacture coal gas in place of water gas. Coal gas is made because it seems to them better business policy. If an expense follows they should meet that as it occurs and let the residual account stand it. If a new oil field should be discovered close by Detroit there would be less coal gas made perhaps, and your asset would be worth nothing to you. Time was, and only a few years ago, that you made water gas in preference to coal gas. To-day the majority of the companies prefer to make coal gas.

Mr. Ewing—As I understand it, Milwaukee is having built near it a large number of coke ovens, and the product of these coke ovens must be sold by the gas company or a common contractor. Now if it goes into the hands of a contractor, won't the business of the Milwaukee Gas Company be worth more to that contractor in advertising? Will he not realize upon the benefit of the advertising to a greater extent than he will the business of the new Company? Isn't that the best way to look at it?

Mr. Dean—The asset that Mr. Ewing speaks of is the goodwill of the business. A merchant sells a retail store and he gets something for the goodwill of the business. If the business becomes unprofitable his asset of goodwill would be depreciated and its value is very uncertain. If the term "Genuine Gas Coke" has been used in this State, and has been treated as a pure brand of coke, then it is an asset that is worth

something; but it is not a tangible asset if you cannot put your hand on it. It is simply the goodwill of the coke business.

The President—If a man buys out a business and pays $50,000 for it, that is his original invested capital account. He buys everything; the stock of goods and the manufacturing industry and the goodwill of the concern. If he loads that business up with charges to construction account of money used in advertising he is showing net earnings on a fictitious value. You are paying something on something you haven't got. Manufacturing industries, or at least a great many of them, add the value of their patents; but that is a tangible value, because it is a protection by the United States Government, and nobody can come in and touch a thing of that kind. You wouldn't charge $300 that you paid to a solicitor to construction account?

Mr. Ewing—No, I would not, Mr. President; but as I understand the company that is spending an enormous amount of money to get new business, and the new business when it gets it if it is worth anything to the company, it seems to me the cost of getting it is part of the value of it, the same as service pipe. As Mr. Dean says, the property goes out, and yet it is a construction account with every company. You can't lay your hands on it; it belongs to the property owner, because it is on his property. If the property itself is worth something—I merely suggest this, because it seems to me it is worth the discussing.

Mr. Wolff—It seems to me that in most of his talk Mr. Ewing has confused an item as a reduction of part of the expense account. As long as we are in business we probably shall sell gas, and indeed some of us would think the money we spend for that would increase the value of our business, which it undoubtedly does; but it is possible that you will not make any coke, that you will make gas by another process, and then the money you had charged in there wouldn't be worth a cent. If you had $10,000 charged to capital account for promoting the sale of coke and you expect to make coke, you expect to get it out. If you were in the manufacturing business and some one infringed on you and you sxpended $1,000 in defending patents, you wouldn't charge that to capital account.

Mr. Ewing—You pay so much for your patent—that is, if you care to use that as a sample. At the end of a given number of years that patent is useless; the government protects you no longer. The same thing with your coke. If you spend money to build up that business which runs through a period of years, I think the original amount, or at least a proportion of it, is a legitimate charge to construction account.

Mr. Dean—There can be no parallel between an expense of that kind and a patent, which runs for a certain number of years. The value of the patent consists in the protection of the United States Government. The other is your coke business advertising. Your coke will sell at the market price. If you can meet the market price with a profit, it has some value. It may be that water gas may be cheaper than coke. You may put the word "Genuine" on it and get an advantage from that; but here is Royal Baking Powder; they may advertise that until doomsday, but the fellow that sells alum baking powder at 10 cents steps right in and takes the customer.

A Member—Does he?

Mr. Dean—Yes, he does. Construction account only concerns such property as the company absolutely owns.

Mr. Ewing—A part of that argument I would like to contradict is that the coke business can't come in and take away the gas company's trade, a question I think which is worthy of discussion. They can't, if you advertise your coke as a free burning fuel.

Mr. Douglas—Without clinkers?

Mr. Ewing—Well, leave out the clinkers. A certain per cent. of your customers they can't get. You have simply to brand into their minds the fact that you have "Genuine Gas Coke."

The President—One thing that brings about the condition is this: For the past 10 years gas men have bought up plants, reorganized them and developed the gas business. Now a lot of foolish men who don't know anyting about the gas business at all have seen other men succeed and they have gone into the gas business. Fellows of this kind, druggists, bankers and grocers, have been buying out gas companies. After every gas company is purchased there is always more or less what may be termed betterments in construction. For instance, in this town, when we came here there were a large number of "improvements" not exactly in the way of new work. You have it in Detroit; you have it in every town where a company has been reorganized. It is going to take quite a bit of careful thought to analyze and determine what you are going to charge to betterment or construction account. I think all of us have got into the condition where we are liable to err on the side of betterments to show our net earnings on the rise. If you start to putting in new business, advertising, etc., we won't have anything left after awhile.

Mr. Dean—Yes; you put a boiler in the gas works and you charge it to construction in the first place, but I suppose in operating it you will always charge it to expense account.

The President—Yes, sir.

Mr. Dean—Do you know any gas company that has any difficulty in getting its construction account high enough?

The President—No, sir.

Mr. Knight—I think it is a good opportunity to refer to what was said in the President's address last year regarding depreciation. In that paper I said that it was one of the important things that had not been dealt with properly, in my judgment, by the gas companies generally. It is certainly one we know they are familiar with. There is nothing about the property of a gas plant but that depreciates every year, whether machinery, buildings, benches, or what not. Now Mr. Ewing is not entirely wrong, nor does he differ very much from Mr. Eaton. Mr. Eaton says it is proper to charge that expense to 3 years. You charge construction, and that is a depreciation which you accomplish. You give a different value than you do when you are talking with the city assessor or the State tax commission. Why is it gas companies don't have a depreciation account to charge off our retort houses, boilers, apparatus, mains and services? That is one of the most important parts of our business. It is part of the work we ought to do. We ought to arrive at some agreement as to what these things are, and have some uniformity in that respect. If we are selling a gas plant there is one valuation and if we are paying taxes on it there is another, but to make things right with the State Gas Commission we are intending to have we have to get in line on that proposition.

On motion a vote of thanks was extended to Mr. Ewing for his paper.

The next subject taken up was the

REPORT ON THE PROGRESS OF THE STUDY OF NAPHTHALINE,

by Prof. Samuel Ball, of the University of Michigan. On motion, the full consideration of the report was deferred until the supplemental report on the subject is presented at the meeting in September.

FINISHING THE QUESTION BOX EXAMINATION.

The Secretary—The next question is:

> "What methods should be used to protect steel gasholder tanks from ice, other than the use of steam?"

I asked Mr. Forbes to respond to that, and he said they didn't have steel gasholders in his district.

Mr. Traver—The first protection, of course, is on the top of the tank, to keep the ice and snow off as it falls. That is done with what they call weather boards. As far as any protection to the steel tank not much exposed that probably would be enough; but if the tank is exposed to a sharp, cold wind, so that ice will form very rapidly, I would recommend putting wooden "lagging" around the tank, with an air space. I think that would be sufficient to protect it.

Mr. Barthold—After all these precautions are taken to keep it from freezing, if they would follow that up with systematic testing for anchor ice with a sounding bar, it would aid largely.

Mr. Davis—I would like to ask if it wouldn't be practicable to put a foot or so of tar on the top of the water in the tank?

Mr. Barthold—It would, if you didn't care how your holder looked.

Mr. Eaton—It would simply protect the top of the water. There is no difficulty on top of the tank; it is down on the sides, nearly to the bottom, where your trouble begins, and I think Mr. Barthold and Mr. Traver must be satisfied that the theory of the formation of anchor ice at the top and settling is not a good one. I think it is found that the formation is towards the bottom and works towards the top.

The Secretary—Another query is:

> "What is the best way to connect outside gas lamps to prevent freeze-ups?"

Mr. Zwissler—If you connect up your outside lamp with a lime box I don't think you will have any trouble with freezing. This is a small box, 12 inches long, 4 inches wide and 5 inches deep. The Minneapolis Gas Company has a good many in use, and there they have no trouble with the freezing of the gas. There is a sample box here if anybody would like to look at it.

Mr. Fraser—I would like to ask how often the box has to be refilled?

Mr. Zwissler—Once a year; taken out in the spring, and refilled and put back again in the fall.

Mr. Douglas—Would that have capacity enough to be put right on to your meter?

Mr. Zwissler—No, sir; but you can run a separate pipe to your lamp.

Mr. Douglas—Doesn't have capacity enough to put it on at the meter?

Mr. Zwissler—No, sir.

Mr. Knight—That is put on the riser, isn't it? Connects with the riser that goes to the lamp?

Mr. Zwissler—Yes, sir.

Mr. Ewing—I would like to ask what pressure that absorbs?

Mr. Zwissler—I don't know that I can answer that, Mr. Ewing.

Mr. Knight—I shouldn't suppose it would absorb any.

The Secretary—The next question:

"How can we best dispose of our coke breeze?"

Mr. Knight—I think Mr. Blowers can answer that better than I can. I will state the way I understand it. In the yard we get a quantity of nut coke and breeze; we estimate at the beginning there is about 85 pounds per ton of coal carbonized, and that nut and breeze we sell in the same quantities at $3.50 a ton, when No. 1 coke is worth $5.50. Then we have ½-inch heavy wire screen which we screen that nut and breeze over, and we get what we call "nut coke." We cannot begin to supply a demand for this in houses, for cook stoves, base burners, etc. Get a special demand for that at the same price at which we sell coke—$5.50 a ton. The breeze that is left, amounting to about half in volume of the breeze taken, we sell at $2 a ton delivered. We have made considerable effort to get some trade on that, and at certain seasons of the year we are able so sell all we make. Sometimes, when we are selling coke freely, we have trouble with it, and sometimes we can't fill orders; but if we had a uniform quantity to use I should never use anything else under our boiler; $1.50 a ton is what it nets us delivered. It is the cheapest fuel we have ever used under the boiler. It is less troublesome to dispose of than any other we have. I think a very interesting question would be, "How to get rid of our coke."

Mr. Ewing—Coke breeze in Detroit is not a serious problem just now. We are disposing of a considerable quantity for use in the water gas generators. Some experiments there showed coke breeze could be used with the same advantage as good coke in generators, providing they were the larger types. More recently they have commenced to use it with the same success in the smaller types. That, however, does not dispose of all of our breeze by any means. The problem is how to dispose of the balance.

Mr. Barthold—I would like to ask Mr. Ewing as to the comparative results obtained in using coke and this portion of breeze; as to how it affects the make per hour and how it affects the CO_2 formed, and all those different things with the various effects?

Mr. Ewing—I can't go into detail as to the data called for. I think possiby Mr. Baldwin could give them in detail. My information comes from our superintendent, who has said he would give just as much for breeze in his generators as he would for good coke. He cannot use it entirely, it has to be in a given proportion.

Mr. Baldwin—All data I have been able to collect on that I had to collect for certain reasons. We found, in making over 400 millions feet of water gas without breeze, we used about 36 pounds of fuel per 1,000, and on 400 millions with breeze and coke, figuring it 16 per cent. breeze and the total data, we found about .03 pounds less with breeze, or the mixture, than when we used coke. As to the make per run it is practically the same, as far as we could see. There was a very small difference, not over 4 or 5 hundredths.

Mr. Eaton—What does that mean per hour; what per cent. difference?

Mr. Baldwin—Well, we make about 4 runs to the hour; about 1,000 cubic feet an hour difference.

Mr. Eaton—Averaging how much per hour with a machine?

Mr. Baldwin—We average about 60,000 an hour on each machine.

Mr. Eaton—Practically little less than 2 per cent. less capacity?

Mr. Baldwin—Yes; about 2 per cent. less.

Mr. Whalen—I would like to ask Mr. Baldwin if he has very much clinker to contend with?

Mr. Baldwin—No; that is a point I make. The clinker was much less than the size of the generator. We have a special method of putting in our breeze. We used screened coke in the center, or the coke right from the retort. When we take the coke right from the yard we use the screened or forked coke as much as possible, and the coke is placed in the center and the breeze placed around the outside. In the center of the generator we have a spreading pan for going around this, enabling it to work to the edge of the machine or heating brick. The brick gets so hot and the clinker gets so hot I think it melts the latter to a large extent. I think there must be a certain amount of iron in our brick which unites with the clinker about the edge of the generator.

Mr. Eaton—The hours lost by clinkering you found were less by using 16 per cent. breeze than with your coke?

Mr. Baldwin—Yes; we found we took less time clinkering; but we found we took a few minutes more coking up.

Mr. Eaton—It means then no loss or saving in time?

Mr. Baldwin—Practically no loss or saving because it takes about 3 minutes to shovel the breeze in. We found it practicable, when using 7-foot generators, and got good results. On making some tests I first found it was not a success. I asked Mr. Dewey if he wouldn't run some tests on the machines. We took an average sample of the water gas and found the candle power was materially increased; we got more returns from a gallon of oil. The water gas makers are graded according to the candle power they get out of the oil. I was much in favor of using the breeze and it has been used since the latter part of December. We find no difference in the blast, excepting that we use a trifle higher blast pressure, that is all, because it makes a much heavier bed of fuel. As the center of the generator is freer we have a much higher heat, and the gas pressure really doesn't count very much. There is a slight difference with our generator. Of course, we have a certain amount of breeze in the center of the machine, and I find when we don't use breeze that the centers of the machines get dark. We coke up our machines from a trolley. We run buckets right over from the coke bin, and when I open the doors the centers of the machines are dark, and when we do use breeze it is almost a white heat.

Mr. Barthold—I think the fact that he does not get as many clinkers by using part breeze is because he puts the breeze around the outer edge of the generators and is shoving his blaze up in the center. I should think he was cutting down the capacity while he is using breeze; he is cutting down the temperature. We find we can't use breeze on the 8-foot generators. It cuts down our candle power, and we get an increased amount of CO_2. I can't get it through my head that they can make as much per hour with breeze, and his own statement goes to show it is cut down because they are cutting down the size of their blaze by putting breeze around there.

Mr. Baldwin—After coking up I find the top of the fuel is bright and even. We don't have a very bright spot on the edge of the generator—don't have that very incandescent spot on the side of the wall, and the whole top of the generator is the same heat as I figure it. If we don't use breeze we just get to the white heat. The other heat is more intense.

Mr. Barthold—With your black spot in the center, with a spread of coke, you are doing all your work on the outer edge. If you use straight, screened coke and keep the black spot out of your generator, which you can do, you can increase your make very much per hour.

Mr. Baldwin—Well, it didn't show it that way with over 400,000,000 feet—or over 800,000,000. Breeze practically is worth just as much as coke in the amount per hour.

Mr. Knight—I want to ask one of these gentlemen, or both of them, what they mean by breeze; whether you mean everything that is left after forking the coke.

Mr. Baldwin—We say any size less than nut coke, and we put in coke that we can't sell.

Mr. Knight—What is the lowest size screened?

Mr. Baldwin—Furnace, stove and nut.

Mr. Knight—Do you remember the size of the screen?

Mr. Baldwin—Yes, half-inch; the rest would be breeze. We find that which doesn't go into into breeze is piled out; never have market for it. Now we have to make a market for it because we have to use as much as we can in the generator.

Mr. Whalen—I would like to have you explain to us what you pay your water gas maker.

Mr. Baldwin—If the water gas maker is getting 5 candles per gallon the rate would be $2 a day; if he is getting 5½ candles per gallon of oil his wages will increase accordingly, as will be the case if he is getting a result of 6. We keep a very close check on the oil every day, and we pay for 15 days' result on the previous 15, when making out the payroll.

Mr. Whalen—You pay him a salary of so much a day?

Mr. Baldwin—Yes; so much a day. Two dollars a day for 5 or anything under. Sometimes it is the fault of the oil. He can't get the oil in properly, or something is the matter with the spray.

Mr. Whalen—Is there a by-pass on the meter?

Mr. Baldwin—No; we watch that.

Mr. Whalen—I should think it was a peculiar sort of proposition.

Mr. Baldwin—We find the result is much better than it ever was before. They are watching their oil all the time.

Mr. Whalen—Doesn't he sometimes put it onto the other fellow?

Mr. Baldwin—Well, the other fellow always has it in good shape. We take the candle power for the day man and that for the night man. We have two gasometers, one of which is filled during the day and the candle power is taken that night, the other gasometer is filled during the night and that candle power is taken the next day.

Mr. Eaton—It might make a difference, what condition the day man left the machine in, and also the other fellow.

Mr. Baldwin—He would have to leave his machine in good shape, or he wouldn't get good results himself. They work together on this in order to get good, average results. They are tested during the day and they are in good shape. There is no way to get at the by-pass under any circumstances, and no one but the general foreman or night foreman can touch it.

Mr. Eaton—Can't they get to the oil tanks?

Mr. Baldwin—They seal the valve.

Mr. Hester—I would like to ask the gentleman if the use of breeze makes any difference in the superheater?

Mr. Baldwin—We haven't found any trouble with our superheater except during 2 weeks, when we had the carburetter all opened up and found a little coke dust in the valves. We have some drop doors that remedy this difficulty.

Mr. Eaton—Do you burn out your carburetters at every part?

Mr. Baldwin—Every part.

Mr. Whalen—I was in Detroit a few months ago and saw an experiment tried on a machine with slack coal, and would like to ask Mr. Baldwin what the results were.

Mr. Baldwin—It didn't work out very well, because the carburetters plugged up. We found an increase in candle power, but the trouble of putting it in and getting the proper machines for spreading it over the surface didn't pay for the difference in cost. The results weren't anything extra. We just tried that as an experiment.

Mr. Sloan—How do you obtain gas for testing, from each gas maker—that is from each run; or do you have to take it as you can get it, when you test for the candle power?

Mr. Baldwin—That is taken from the outlet of the water gas meter.

Mr. Sloan—Is it taken at any one particular time?

Mr. Baldwin—No; it is taken continuously. We have 3 water gas machines running continuously, aud, therefore, we keep our exhauster going continuously.

Mr. Whalen—And the sample of gas you use is collected all the while?

Mr. Baldwin—Is collected during 12 hours.

Routine Business.

A telegram was then read from the Wisconsin Association extending greetings to the Michigan Association, and letters were also read from Mr. F. H. Shelton, President of the Western Gas Association, in regard to St. Louis meeting and the proposed exhibit there, and in reference to the Gas Association's Card Index.

Report of Committee on President's Address.

Mr. Blowers, Chairman of the Committee on President's Address, submitted the following report:

Your Committee to whom the President's Address was submitted begs leave to make the following report:

The very cordial welcome accorded to the Association by our President, and his efforts for the pleasure and comfort of the members attending cannot be passed without a complimentary notice, and the committee is of the opinion that he can act as President of the Association any time he wants to in the future.

Membership.—We heartily indorse his views in regard to increasing the membership. and the large number of new members admitted at this meeting attests that the Secretary, as assistant to the President, has not been idle. We furthermore suggest that each member of the Association constitute himself a committee of one to solicit new members until every gas company or supply house within the boundaries of the State is represented.

Scholarship Fund.—We believe that the Association will not relax its interest in the scholarship fund; that the same will be maintained, and that this Asssciation must undoubtedly reap great profit from it.

State Gas Commission.—Inasmuch as the next meeting of our Association will be held within a comparatively short time, we suggest that each member take all the means in his power to post himself in regard to the workings of the Massachusetts law, and that one session of our meeting be set aside for the discussion of this matter, and that the session be executive and without reporters.

Advisory Committee.—In our opinion, the matter of advisory committee should be dropped, as the plan outlined at present by the President in his address does not seem to your committee to be feasible, and we believe it will be difficult to organize and maintain such a committee in a manner satisfactory to our membership.

Labor.—The President's remarks in regard to the labor question are very interesting.

Coke.—We quite agree with the President that it is necessary to make a great effort to increase the sales of coke, and suggest that this can best be done through co-operation of the various companies who produce coke in the matter of price and advertising, that the energies of all may be directed toward popularizing the use of gas coke, not only in their present local markets but throughout the State.

Length of Meeting.—We heartily concur in the recommendation in the President's address that the time of the meeting be extended to cover three days instead of two as at present, and we would suggest that the Association take action at this time to so extend it.

We also recommend that the initiation fees as well as the dues be increased from $2 to $3 per year, as the increase in membership will require larger income to meet the necessary expenses of conducting the business of our Association.

We desire to congratulate our President on his very interesting address, and we are proud to hand it down as part of the proceedings of this Association.

All of which is respectfully submitted.

F. W. Blowers,
W. H. Barthold,
F. R. Persons,
} Committee.

On motion of Mr. Knight the report was adopted.

Mr. Persons—I understand that action raises the dues without further action being taken.

Mr. Douglas—I think according to the Constitution that requires an amendment to the by-laws.

Mr. Persons—Mr. President, it will be necessary to present that amendment in writing, will it not?

Mr. Douglas—We cannot do anything with it at this time. A great many have paid their dues. It cannot be acted upon until the next meeting.

Election of Officers.

The Nominating Committee then made the following report:

Your committee beg to nominate the following gentlemen to serve as officers for the ensuing year:

President.—Mr. S. E. Wolff, Manager, Jackson Gas Company.
Vice-President.—Mr. E. F. Lloyd, President, Adrian Gas Company.
Secretary and Treasurer.—Mr. H. W. Douglas, Ann Arbor.

F. W. Blowers, Chairman.

On motion, Mr. J. J. Knight was instructed to cast ballot of the Association for those nominated. He subsequently announced that the instruction had been carried out.

Next Place of Meeting.

The Committee on Place of Next Meeting submitted the following report:

Saginaw, Mich., Feb. 18th, 1904.

Mr. President, Members of the Michigan Gas Association: Your Committee on Place recommend that the next meeting of the Michigan Gas Association shall be held the third Wednesday in September, 1904. We recommend that this meeting shall be held in Jackson, September 21st, 22d and 23d, 1904.

It has been deemed advisable to hold this meeting in September of this year, in that, if we waited until 1905, there will be a lapse of 18 months between meetings.

In order to strengthen the Association, we believe that all interests will be best served by having this additional meeting in 1904.

Respectfully submitted,
Alonzo P. Ewing,
John Hellen,
F. R. Persons,
} Committee.

On motion, the report was adopted.

The Scholarship Fund.

The question of the yearly scholarship fund subscription was then taken up and Secretary Douglas read the following report:

The Committee on the University Scholarship Fund reported that the fund was in a prosperous condition, after which subscriptions were asked

for, with the result that over $800 were promised for the coming year. The detailed statement respecting the fund is appended:

On hand, last report	$555.00
Received from subscriptions	741.00
" American Gas Light Association, Entertainment Committee	72.19
Interest on account	17.37
Total	$1,385.56
Paid to the University of Michigan	600.00
Balance on hand in Scholarship fund	$785.56
" " general fund	23.06
Total	$810.62

Mr. Persons read a letter from the Secretary of the Ohio Association, inviting the Association to the Cleveland meeting in March.

The President—Gentlemen, I do not want you to forget that at 2 o'clock a special car will leave the Bancroft House for the gas works and return. Any of you who would like to look over the works we will be very glad to welcome.

A Present from the Western Association.

The Western Gas Association Card Index was presented to the Association in the name of Mr. Shelton, and the Secretary was instructed to tender thanks for the same.

The President—I would like to say that while I feel our Association has been very successful this year, I want to thank personally our members for the help they have extended, the gentlemen who have prepared the papers, and to Mr. Douglas, our Secretary, one of the most capable officers I have seen; it will be well to keep him here for years to come. I wish all Godspeed and success to the Association, which I think is going to be a winner in every way.

Votes of Thanks.

Mr. Dean submitted the following:

Resolved, That this Association tender Mr. Cobb and the Gas Light Company, of Saginaw, their thanks for the cordial and splendid manner in whlch this meeting has been provided for; also for the energy and tact displayed in procuring places for conducting the meetings. [Adopted.]

The meeting was then declared adjourned.

Steam Turbine Efficiency.

Iron Age notes that data on the performance and efficiency of steam turbines have for the most part been far from perfect and complete. It is, therefore, gratifying to review the results of an extensive test recently made on a 1,250-kw. Westinghouse-Parsons turbine, as given in a recent issue of the *Electrical World and Engineer:*

The turbine was of the 2-cylinder multiple expansion form, arranged in tandem compound, and direct connected to a revolving field type generator, delivering 3-phase, 60-cycle current at 11,000 volts when running at a speed of 1,200 revolutions per minute. The unit is the first of three to be furnished to the Interborough Rapid Transit Company for the illumination of the New York Subway. The contract guaranteed that with a 175-pound steam pressure at the throttle and a vacuum of 27 inches in the exhaust the consumption of steam at various loads should not exceed the following:

	Pounds per E. H. P.—Dry Saturated Steam.	Pounds per E. H. P.—Steam Superheated 75° F.
Full rated load	15.7	13.8
¾ rated load	16.6	14.6
½ rated load	18.2	16.2
¼ rated load	23.2	20.8

The results actually obtained were as follows:

With Dry Saturated Steam and 27 Inches Vacuum.

Load in Kilowatts.	Fraction of Full Load.	Consumption Per E.H.P.	Pounds Steam Per Equivalent I.H.P. of a Reciprocating Engine.
196.95	0.158	27.08	12.78
342.73	0.276	21.18	12.89
655.98	0.525	17.14	12.82
989.53	0.79	15.27	12.49
1,321.46	1.06	14.52	12.44
1,988.9	1.59	15.21	13.69

With 75° F. Superheat and 27 Inches Vacuum.

333.55	0.267	20.51	12.34
664.67	0.531	15.9	11.94
986.23	0.79	14.45	11.81
1,293.9	1.038	13.78	11.77

With Dry Saturated Steam and 28 Inches Vacuum.

Load in Kilowatts.	Fraction of Full Load.	Consumption Per E.H.P.	Pounds Steam Per Equivalent I H.P. of a Reciprocating Engine.
334.78	0.268	20.71	12.48
972	0.778	14.91	12.09
1,363.95	1.091	14.02	12.07

With 75° F. Superheat and 28 Inches Vacuum.

333.15	0.266	18.86	11.33
977.64	0.78	13.87	11.31
1,274.2	1.02	13.17	11.23

The first set of conditions show that the results were considerably better than were guaranteed, and it should be mentioned also that they were obtained with a steam pressure of 147 pounds instead of 175, because the latter was not available. The tests made under the other conditions were in the interest of general information. It is so usual to define steam engine economy in terms of the indicated horse power that, to put the turbine on a more readily comparable basis, the last column of figures was deduced, allowing the combined efficiency of an equivalent engine and generator to be 85 per cent. and assuming the losses constant at all loads. These are fair assumptions which if anything favor the steam engine.

To test the speed regulation a load of 1,309 kw. was suddenly thrown off by opening the exciter current, with the result that the speed increased but 2 per cent. A load of 1,342 kw. was then thrown on and a speed variation of 2.2 per cent. in the opposite direction followed. The safety stop, which is provided with the turbine to prevent its racing if the governor fails to act, proved its efficacy by stopping the turbine at an increase of 14.35 per cent. above normal speed when the governor was held down.

SPECIAL ENGLISH CORRESPONDENCE.

Communicated by Norton H. Humphrys.

Salisbury, England, Mar. 10th., 1904.

Increased Demand of Gas.—A Question of Finance.—Two Presidential Addresses.

The principal feature in the accounts of gas companies for the second half of 1903, which are or have been considered during the last few weeks at the meetings of shareholders, is the large increase in the demand for gas. With very few exceptions a considerable improvement on the corresponding period for 1902 is recorded. And the reason is not far to seek. The weather is a convenient excuse for covering a deficit, and it might be urged that this cuts both ways, and that the increase is substantially due to colder or darker weather. As applied to the month just closed there would be some reason as it was substantially colder and darker than February, 1903. But the weather previous to 31st December last does not carry this interpretation. The real reason of the additional business is the increased application of the incandescent gas light. The public are appreciating the fact that it is not only the best but also the cheapest light extant. This is forcibly shown by a very complete serial article recently issued in the *Journal of Gas Lighting*, and dealing with the street lighting in the 29 districts constituting the Metropolis. The result of the particulars furnished by the official authorities is summarized as follows:

In the streets of London there are to-day—

Electric arc lamps	4,974	
" incandescent lamps	1,185	
		6,159
Gas incandescent lamps	56,690	
" flat flame "	18,248	
		74,938
		81,097

from which it will be seen that gas holds no less than 93 per cent. of the public lighting. And yet there are those—and I am surprised to see one or two among the number who ought to know better—who regard gas as a lighting agent as a thing of the past. Evidently the London local authorities, who may be expected to know how to get the best value for their money, do not think so. And a very large section of the public do not think so.

Many people looked with some misapprehension on the possible effect of the introduction of the incandescent gas burner. Even fairly minded and liberal disposed individuals, who acknowledged that the right thing is to cultivate any improvement that gives more value for the same outlay, thought that there would be a marked falling off for a year or two at any rate. One or two companies have suffered a little in this way, especially those who had a large number of Bray's or Sugg's high power burners in use, but the majority do not show any evidence of the kind. Yet in many cases a group of flat flames, using 30 to 50-candle power per hour, has been replaced by an incandescent burner using 10 feet. In ordinary domestic consumption it is no uncommon thing to find a Kern or a "C" burner, consumption 3½ feet per hour, displacing a 10

to 15-foot consumption in flat flames. And yet we have the remarkable fact that in most cases the normal rate of increase has continued. Where a good maintenance scheme has been introduced it has gone further than that, and the increase has been above the normal. The only feasible explanation is that a large number of additional lights have been put on. Looking through the rental ledgers one finds here and there a substantial reduction, but in most cases the consumption per consumer continues as before, showing that if less gas is used per burner an additional number of burners must be laid on.

It is the same thing with cooking stoves. Improvements in these have been such, that it is no exaggeration to say that they operate more efficiently with one-third the quantity of gas, as compared with those in use 30 years ago. But compare the consumption of gas to-day with that obtaining in 1874. How many would care to run through the hours of daylight with the amount of supply pressure that was found to be ample in that year? In most districts some extra pressure at the prevailing meal hours is absolutely necessary, and the summer consumption has increased 300 per cent. And so it will be with the incandescent light. The increase above noticed is a sign of the natural expansion following the introduction of a wonderful improvement. And the moral to be gathered is to be up and doing. Leave other people to croak about gas having passed its zenith, etc., etc., and get up a good maintenance scheme, which is one of the best advertisements that gas companies can possibly have. The only possible objection, or what may be called an objection by people who like to stand still, is that it will lead to increased consumption, which eventually means more capital. A continual growth of business means more retorts, larger purifiers, larger gasholders, bigger mains, to say nothing of outlay for services, meters, and stoves on hire, and these cannot all be provided out of revenue. But the only safe policy is to go forward. It is impossible (even if it is desirable, which I venture to doubt) to stand still, and not at the same time go back. The fact that the gas company are not inclined to move soon becomes known, and there is no more powerful escape for the benefit of rival companies.

Last year we extended our mains into an outlying district comprising some 200 workmen's residences. Orders came in for a few dozen slot meters and cookers, and a small staff of 3 or 4 men were engaged there. But one or two big orders came in elsewhere, and in order to clear up as we went along a strong contingent of about a dozen were sent up to make a quick clearance of the applications on hand. But the result was that orders at once came in three or four times as fast as before from that small district. One applicant said: "I am glad to see your people are waking up. Lots of us want the gas, but thought it was no use to apply yet, as we should not get it for a twelvemonth." The deduction is obvious.

Some light has been thrown on the methods followed by promoters of electricity supply enterprises, in the course of a Government inquiry held in the north of England, in respect to the borrowing of further capital by a local authority, for the purposes of extending the electricity undertaking. A ratepayer raised the objection that sums properly applicable to revenue had been charged to capital, thus apparently reducing the revenue expenditure and increasing the balance available for profit to a corresponding extent. I have seen accounts of more than one electricity supply company in which the amount put down for repairs and maintenance of machinery, meters and mains is a mere fraction per cent. Anyone who has had experience in maintaining plant and machinery for a term of years will know that the working life of dynamos, generating machines, transformers, switchboards, meters, distributing lines, etc., is not to be reckoned in centuries, and that before striking a balance of profit a fair allowanee should be made for depreciation, or else that a sufficient proportion of the plant should be renewed, to bring the structural value on the 31st December to a sum not less than that on the 1st January. Unless that is done, the profit has been earned to some extent at the expense of capital, and if such a course is followed over a term of years, a time will come when the managing committee will find themselves in possession of a spent and worn out plant, and no funds available for the purchase of new. The objection above referred to was to the effect that the price paid for certain apparatus, in addition to its proper cost price, was arranged to also include several years' maintenance, and that the whole was charged to capital, with the result that the revenue account was relieved of substantial charges that should properly be included in it. Obviously this, of course, is not sound finance, and is liable to create a false impression as to the value of the undertaking as a money earning affair. If the plant costs £10,000, and £12,000 is paid for it, viz., £10,000 for first cost, and £2,000 for maintenance over a period of four years, £2,000 is added to capital which ought not to be there, and the revenue is relieved of £500 per annum. Deduct from this the interest on £2,000 at 5 per cent., £100, and the balance available for profit is shown as £400 more than it should be. This point is especially important if any proposal for a transfer of ownership, or for the raising of fresh capital, is in the air.

Applying a similar principle to a gas undertaking, it would be possible to sell very cheaply for a time, or to show an abnormally large balance of profit. For example, the first cost of a bed of retorts might include a liberal allowance for scurfing, repairing of furnace, etc. Purifiers might include revivification of gas, etc. Gasholders, the cost of painting, and thus the cost of running the concern, would come down to little more than materials and labor.

With the month of March the spring meetings of District Gas Managers' Associations have commenced. In previous years I have remarked on the difficulty of preparing an inaugural address of an original character, but that objection does not now hold good. So many problems have entered into the gas engineer's field of operations that the difficulty is rather to prepare an address that is not of a fragmentary character, or else of a length that is likely to try the patience of the hearers. And the tendency appears to run in the direction of a cursory scamper over the whole programme, rather than towards a full discussion of a comparatively few subjects. The President who wishes to do full justice to any one topic, will soon have to consider the advisability of taking up one department only, such as the works, the outside district, the sales, or the consumers. In respect to either of these it is possible to talk for an hour without repetition or want of novelty. Two such addresses have been published. Mr. Helps, speaking at the Midland Association, inclined to a survey of the whole situation, while Mr. Townsend, at the meeting of the Manchester District, confined himself more particularly to the questions of sales and dealings with customers, pushing gas consumption both as regards lighting, burners and stoves, concluding with a brief reference to general topics, as Parliamentary procedure, labor problems, stoking machinery and insurance. Both these speakers possess in a marked degree the element of originality. One cannot imagine either Mr. Helps or Mr. Townsend as blindly following the lead of someone else, or the prevailing trend of thought, and their remarks will be perused with interest, even by those who may not be inclined to accept all their conclusions. Both addresses furnish excellent examples of the present position and of the views held by steady, experienced workers. A notable feature at the Manchester District meeting was a paper on "Horizonial vs. Inclined Retorts," followed by one entitled, "Notes on Carburetted Water Gas." These papers had been circulated in advance, with the result that two speakers held the floor until the time for closing arrived and the discussion was necessarily adjourned. So far as may be judged from the commencement it is likely to extend over more than one meeting, unless the members copy Parliamentary procedure and take an all-night sitting. It is no uncommon thing to meet with complaints as to the absence or meagerness of discussion, but the Manchester gentlemen appear likely to realize that it is possble to have too much of a good thing.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

MR. A. W. LITTLETON, the only "Gas.," sailed for Europe, from New York, per steamship "Cedric," the morning of last Wednesday. He is accompanied by his wife, and they propose remaining abroad for two years or more. May the best of good luck attend them in their voyaging.

THE contract for the construction of the new gas plant at Egg Harbor, N. J., has been awarded to Mr. Frank D. Moses, of Trenton, N. J.

MR. FRED. G. HANLIN, Treasurer of the Natick (Mass.) Gas and Electric Company, has notified the holders of the outstanding bonds, bearing 6 per cent., and dated October 1st, 1895, that the Company has elected to redeem the same, at the rate of par and 4 per cent. premium. Interest on the bonds will cease the 1st prox., and the fiscal agent in respect of the transaction is the Massachusetts Trust Company, 60 State street, Boston, Mass.

THE Cruse-Kemper Company, of Philadelphia, Pa., has been awarded a contract for the construction of a single-section gasholder, to rest in steel tank, on the plant of the Cambridge (Md.) Gas Company. The capacity of the vessel is put at 20,000 cubic feet.

ANOTHER contract for the Cruse-Kemper Company is the award to it for the construction of a single-section holder, to rest in steel tank, for

the Egg Harbor (N. J.) Gas Company. The holder is rated to retain 25,000 cubic feet.

THE creditors of the Paris (Ills.) Gas Light Company, which concern is now in charge of Messrs. George E. Levings and John C. Risser as Receivers, have petitioned in the Circuit Court for the district for an order of foreclosure. Under the petition Judge Craig appointed Attorney Frank T. O'Hair as Special Master in Chancery, to take evidence in the matter. The complaining or moving creditors in the action are the American Trust and Savings Bank, of Chicago, the First National Bank and the Edgar County National Bank, of Paris.

AT a meeting of the shareholders in the Mendocino (Cal.) Electric Light and Power Company Mr. Grindle was elected President and Mr. Albert Brown was chosen Secretary.

MR. C. G. KAISER has been elected a Director in the Practieal Gas Construction Company, of Chicago.

WE regret to be called upon to report the death of Mr. John D. Douglas, who had been connected with the operation of the works of the Binghamton (N. Y.) Gas Company for 25 years. His death occurred the night of the 11th inst. and was the result of injuries received some days before while carrying on his routine duties. He was in his 56th year.

AT the annual meeting of the Bowling Green (Ky.) Gas Company the officers chosen were: President, James T. Lynn; Vice-President, James G. Hickox; Secretary and Treasurer, E. J. Pelton; Superintendent, W. H. Ross.

A CORRESPONDENT forwards the following under date of the 16th inst.: "The Salem Gas Light Company takes pleasure in announcing that it has reached a point when it can give its patrons a reduction in the price of gas. This has always been the ambition of the Company for some years and were the consumption of gas in Salem as large as in some towns of greater size reduction in price would have come easier as a business problem and more quickly. The new net rate is $1.44 per 1,000. It can be readily understood that the new schedule of prices now made by the Salem Gas Light Company is a low one considering Salem's limited gas consumption; and the Salem Company's margin of profit under it is not as satisfactory as is that of gas companies in larger cities under a lower rate per 1,000 feet perhaps, but with a very much greater output of gas. The use of gas for cooking in Salem within the recent few years has not only increased the output of the Salem Gas Light Company, thereby paving the way for a lowering in the price of gas, but it has also proven that the gas range is the most economical method of cooking when properly attended to, as some records given voluntarily to the Company by some of Salem's careful housewives will show. The Salem Gas Light Company has made the reduction in price, desiring to give its patrons the benefit of results arising from the increased output of gas for fuel, and all it gets in return is the expectation of an increase in the use of gas at the lowered rates."

MR. J. J. JACKLEY proposes to construct a gas plant in Fort Pierre, South Dakota. He has secured the necessary franchise from the authorities.

A CORRESPONDENT in Chester, Pa., forwards the following under date of the 18th inst.: "At the suggestion of Superintendent John D. Shattuck, of the Suburban Gas Company, a formal conference was held last evening with the master plumbers of the city of Chester, at an informal banquet given in Masonic Hall, at which there were present about 35 members of the craft. Covers were laid for about 75, and a course dinner was served in an up-to-date style, which is characteristic of the Suburban Company. The primary object of the gathering, at which were present the heads of departments and other employees of the Company, was not to eat and throw bouquets at each other, but for business, and business that will benefit not only the Company and the plumbers, but mutually the patrons of the concern as well. Heretofore the plumbers who have been called upon to pipe the houses for patrons contemplating the use of gas, have been making anything but a uniform rate for the service. The Company, however, desires to make this rate uniform and agreeable to all concerned, and insure the public a reasonable charge. The Superintendent said this morning that this end, he believes, has been attained by last night's meeting. The matter was thoroughly discussed and a committee appointed to look into the affair and report later. When cigars were lighted, after the viands were disposed of, Superintendent Shattuck put off a huge firecracker to attract attention, which made a report similar to that which results when a lighted match comes into contact with a leak in a gas pipe. The evening was most pleasantly enjoyed. The Company has offered a series of prizes to the plumber who shall submit the best plans and does the best work next year, which will act as an incentive for a revolution in the manner of installing the Gas Company's services in the 600 homes and more which are fitted up each year by this well-known corporation."

IT looks that the rate which may be charged for gas for the ensuing year in San Francisco, Cal., will not be changed. It is low enough in any sense, the figure being $1 per 1,000 cubic feet.

THE San Francisco Gas and Electric Company has declared a dividend of $1.25 per share, payable the 1st prox.

UNDER the Keenan gas bill, now before the State Senate, it is proposed to fix the gas rates in the Borough of Queens, N. Y., outside of Long Island City, on the following basis: From July 1, 1905, until July 1, 1907, $1.20 per 1,000; from July 1, 1907 to July 1, 1909, $1.15; from July 1, 1909, until July 1, 1911, $1.10; thereafter, $1. We imagine there will not be much opposition to this bill from any particular company in Queens Borough.

THE scheme for the betterments on the plant of the Knoxville Gas Company, Knoxville, Tenn., has been agreed upon. The expenditure on such account will not be less than $100,000.

MR. CHARLES P. TAFT has been elected a member of the Executive Committee of the Cincinnati Gas and Electric Company, vice the late Mr. W. A. Goodman.

MR. WILLIAM VON PUHL has been appointed Superintendent of the electric division of the service of the Cincinnati Gas and Electric Company, vice Mr. J. H. Hallberg, resigned.

THE Portage Lake Gas and Coke Campany, to supply gas to the villages of Houghton and Hancock, Mich., has been incorporated. It is capitalized in $250,000.

MR. WAREHAM S. BALDWIN, formerly on the engineering staff of the Detroit City (Mich.) Gas Company, has accepted a responsible position in the engineering service of the Laclede Gas Light Company, of St. Louis, Mo.

A CORRESPONDENT in Chicago, writing under date of the 19th inst., forwards the following: "A decision was handed down this week in the Supreme Court of Iowa, in the case of the Davenport (Ia.) Gas and and Electric Company against the city of Davenport, wherein the city of Davenport was appellant, which affirms the decree of Judge Wolfe in the District Court, and gives to the Davenport Gas and Electric Company a victory in both the higher and lower courts. The difficulty began at the expiration of the first 5-year period of a 25-year franchise, at which, according to the contract, the City Council was to fix the price of the lighting for the next 5-year period. The Council refused to fix the price on the ground that the contract had been forfeited and for the further reason that the Council had no power to make such a contract. Upon this the Gas Company brought suit in the District Court to compel the city to fix the price according to the terms of the contract, which provided that the price should be arranged by arbitration, each party to choose three members of a board, which should name a reasonable figure to agree with the charge made by other cities in Illinois and Iowa of a population corresponding with the city of Davenport. The city defended with the result that a decision was gained by the Gas Company, whereupon the city appealed to the Supreme Court."

A RUMOR to the effect that the Welsbach Light Company was considering the advisability of removing its factories from Gloucester, N. J., to Buffalo, N. Y., seems to be without foundation in fact.

THE J. M. Guffey Petroleum Company acting in conjunction with the Gulf Refining Company, of Pittsburg, has issued a pamphlet entitled "Texas Petroleum," in which it is estimated that the production for 1903 amounted to 14,100,000 barrels. Of this, one-half was credited to the Sour Lake district.

THE AMERICAN GAS LIGHT JOURNAL

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NOTIFICATION RESPECTING ADVERTISING.

Orders for new advertising, or for changes in standing advertisements, to insure attention in the issue following their reception, must be in hand any time of Wednesday.

AGENTS:

New York—American News Co., 39 and 41 Chambers St.
Germany—Lemcke & Buechner, of New York.
England—Aug. Siegle, 30 Lime Street, London.

MONDAY, MARCH 28, 1904.

The Market for Gas Securities.

There was considerable speculation this week in the local gas share market, the basis of the transactions in Consolidated being built on the passage by the State Assembly of the Remsen bill. The highest figure recorded was 201, but the reaction and profit taking which followed, together with a generally weak market, cut the price to 197¾ to 198½, which was the official quotation at the close to-day, Friday. There is little doubt that the bill will become a law, as on its merits it should, if the desire for cheaper gas in New York is genuine. Other city gas securities, in the shape of bonds, are in good demand.

Brooklyn Union sold up to 200, on sales of something like 1,500 shares, which is a record respecting transfers in it for a week during the last 2 months.

Baltimore Consolidated is booming, and the cause thereof is laid to the anxiety of the local electrical concern to make some sort of a deal. Laclede preferred is weak, and Peoples, of Chicago, is also on the damp line; but the laundresses who are washing for the short result should know better. Washington (D. C.) gas is 285, bid.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

MARCH 28.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	197¾	198¼
Central Union, Bonds, 5's	3,000,000	1,000	104	106
Equitable Bonds, 6's	1,000,000	1,000	105	..
" 1st Con. 5's	2,300,000	1,000	118	120
Metropolitan	658,000	..	108	112
Mutual	3,500,000	100	260	290
Municipal Bonds	750,000	..	..	..
New Amsterdam Gas Co. ..				
Bonds, 5's	11,000,000	1,000	105⅛	106
Northern Union, Bonds, 5's.	1,250,000	1,000	102½	105⅛
New York and East River..				
Bonds 1st 5's	3,500,000	1,000	109⅛	111
" 1st Con. 5's	1,500,000	..	106	108
Standard	5,000,000	100	125	135
Preferred	5,000,000	100	145	155
Bonds, 1st Mortgage, 5's	1,500,000	1,000	116	117
Yonkers	299,650	500	130	..
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	194	200
" " Bonds (5's)	15 000,000	1,000	113	115
Bay State	50,000,000	50	3/16	¼
" Income Bonds	2,000,000	1,000	..	75
Binghamton Gas Works...	450,000	100	28	30
" 1st Mtg. 5's	509,000	1,000	93	96
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	3¼	4
" " Bonds, 5's	5,250,000	1,000	65	69
Capital, Sacramento..	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	..
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Cincinnati Gas and Electric Co.	29,500,000	100	96⅜	96⅝
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	101	101⅜
Columbus (O.) Gas Lt. & Heating Co	1,682,750	100	88¼	89⅛
Preferred	3,026,500	100	107⅛	109
Consumers, Jersey City Bonds	600,000	1,000	100	102
Consumers, Toronto	1,700,000	50	218	225
Consolidated, Baltimore....	11,000,000	100	67¾	69
Mortgage, 6's	3,600,000	..	..	118
Chesapeake, 1st 6's.	1,000,000	..	..	..
Equitable, 1st 6's.	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	112
Consolidated Gas Co. of N.J.	1,000,000	100	15	17
" Con. Mtg. 5's	880,000	1,000	86	90
Consolidated G. & E. Co.'s.				
Little Falls, N.Y.	90,000	100	..	100
Bonds	75,000	..	..	100
Detroit City Gas Co	4,825,500	50	..	50
" Prior Lien 5's	5,603,000	1,000	99⅛	100
Detroit Gas Co., 5's	381,000	1,000	75	75¼
" Inc. 5's	16,000	100	98½	100
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	39	40
Fort Wayne	2,000,000	..	..	..
" Bonds	2,000,000	..	55	..
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	245	265
Hudson County Gas Co., of New Jersey	10,500,000	..	25	..
" Bonds, 5's	10,500,000	..	101	103
Indianapolis	2,000,000	..	55	65
" Bonds, 6's	2,650,000	..	103½	106½
Jackson Gas Co	250,000	50	73	75
" 1st Mtg. 5's	290,000	1,000	101	102½
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	79	90
Preferred	2,500,000	100	80	90
Bonds	10,000,000	1,000	109½	110
Lafayette Gas Co., Ind.	1,000,000	100	..	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	136	140
Madison Gas & Elec. Co.				
" 1st Mtg. 6's	350,000	1,000	107½	108½
" 6 per cent. scrip, due 1910	100,000	25	85	87
Montreal, Canada	2,000,000	100	218	184¾
Nashville Gas Lt. Co.	1,000,000	100	110	..
Newark, N. J., Con. Gas Co.	6,000,000	..	56	58
Bonds, 6's	4,600,000	..	105	105¾
New Haven	1,000,000	25	64	70
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	96	96¼
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
2d "	2,500,000	1,000	104	.
Rochester Gas & Elec. Co..	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	87½	90
San Francisco, Cal.	15,800,000	100	..	55
St. Joseph Gas Co.				
" 1st Mtg. 5's	751,000	1,000	92	96½
St. Paul Gas Light Co.	1,500,000	100	45	47
1st Mortgage 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's..	2,465,000	1,000	92	93
Syracuse, N. Y.	1,975,000	100	46	48
Bonds	2,047.000	1,000	94	96
Washington, D. C	2,600,000	20	285	290
First mortgage 6's	600,000	..	..	..
Western, Milwaukee	4,000,000	.	..	..
Wilmington, Del	600,000	50	230	..

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DIVIDEND NOTICE.

OFFICE OF THE UNITED GAS IMPROVEMENT CO.,
N. W. CORNER BROAD AND ARCH STS.,
PHILADELPHIA, PA., March 9, 1904.

The Directors have this day declared a quarterly dividend of 2 per cent. (one dollar per share), payable April 15th, 1904, to stockholders of record at the close of business, March 31, 1904. Checks will be mailed.

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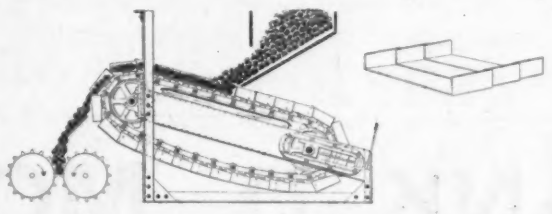
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(1.) Set the specific gravity of the fluid opposite the length of pipe;
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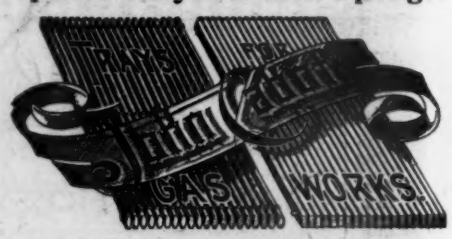

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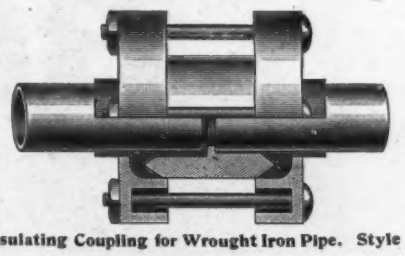

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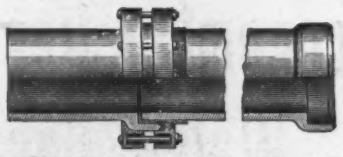

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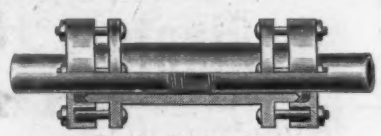
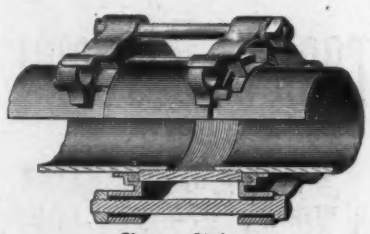


Regular Sleeve. Style 2.



Clamp. Style 4.

Clamps for Cast Iron Pipe. Style 4½.

Pipe Couplings, Sleeves, Clamps, Crosses, Tees and Ells.

My Insulating Coupling prevents the destruction of pipe by electrolytic action, in either water or gas lines.

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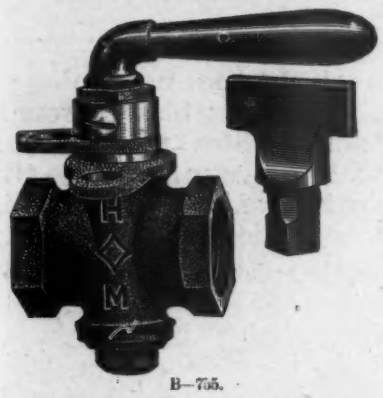

B—755.

TOO little is not as much as you pay for, and too much is more paid for than you need.

In **Mueller Gas Cocks** you find a happy medium--not so little metal as to leave them weak, nor yet so much as to make them costly.

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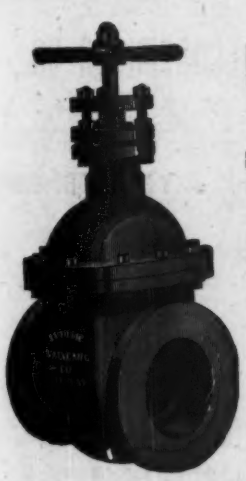

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For Students in Gas Manufacture.

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BY UTILIZING A

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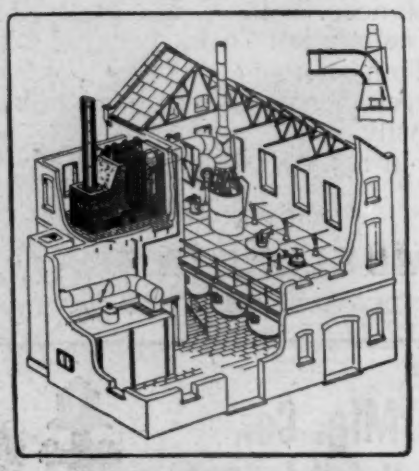

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Write for full particulars how this is accomplished, the saving effected, and the advantages gained, to the

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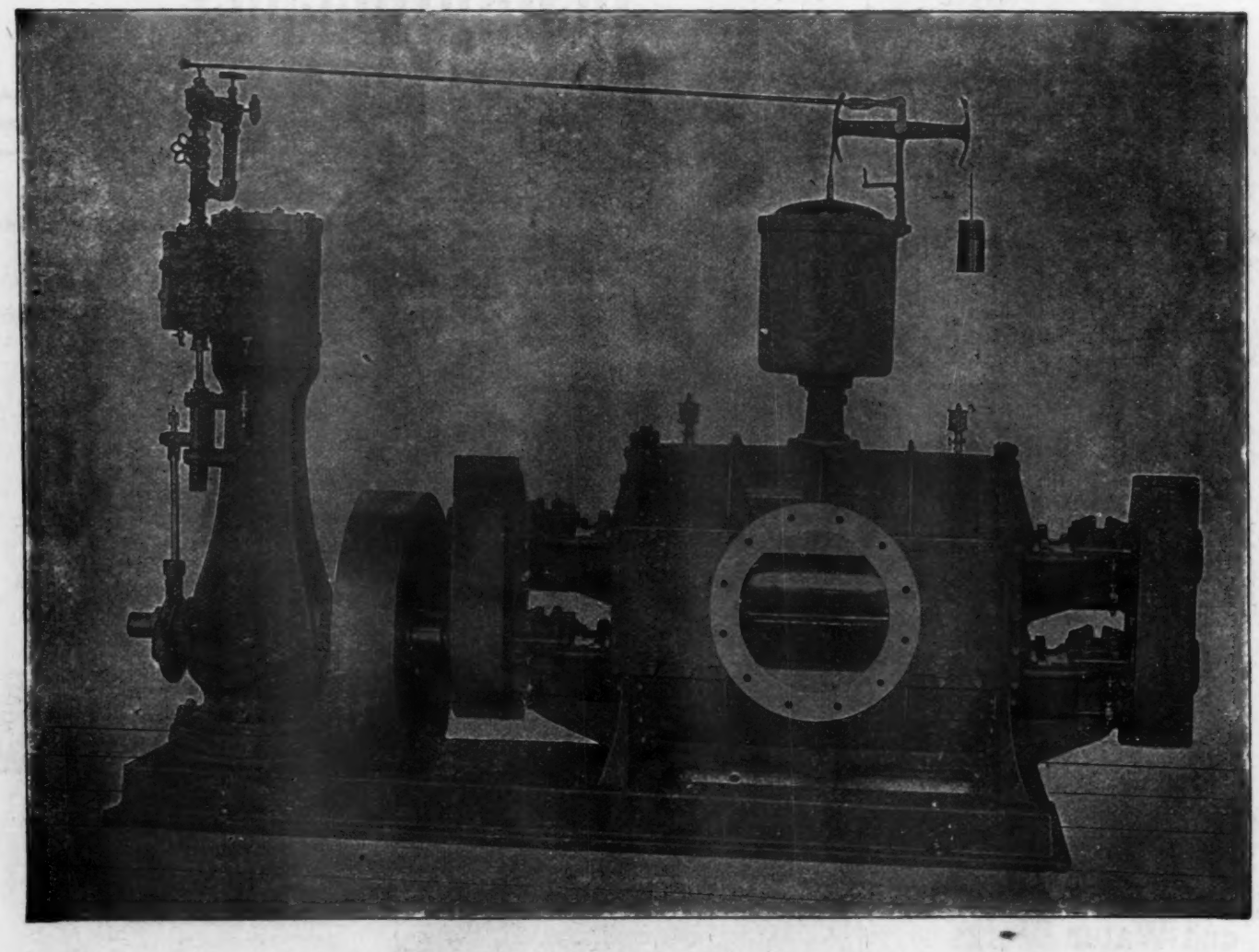

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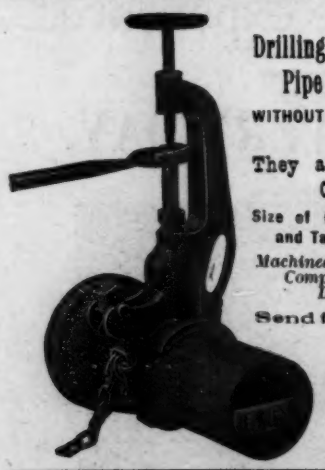

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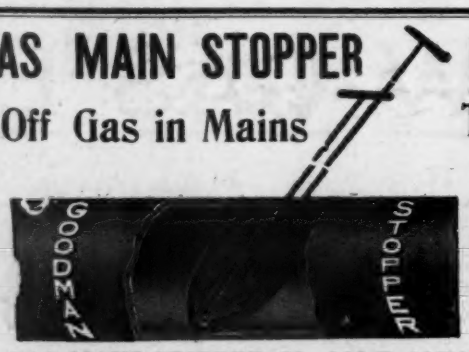
For Shutting Off Gas in Mains

Any size gas main can be shut off in 30 seconds. : : :



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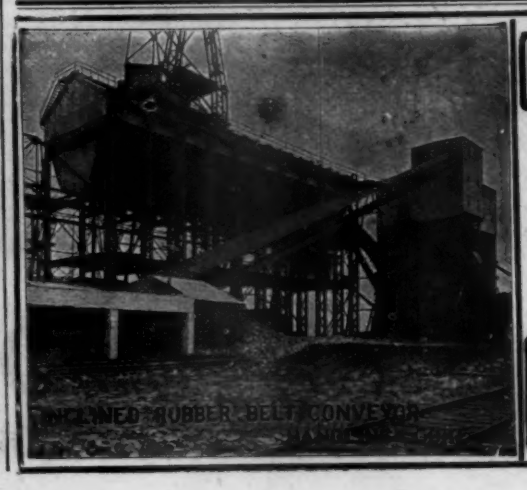

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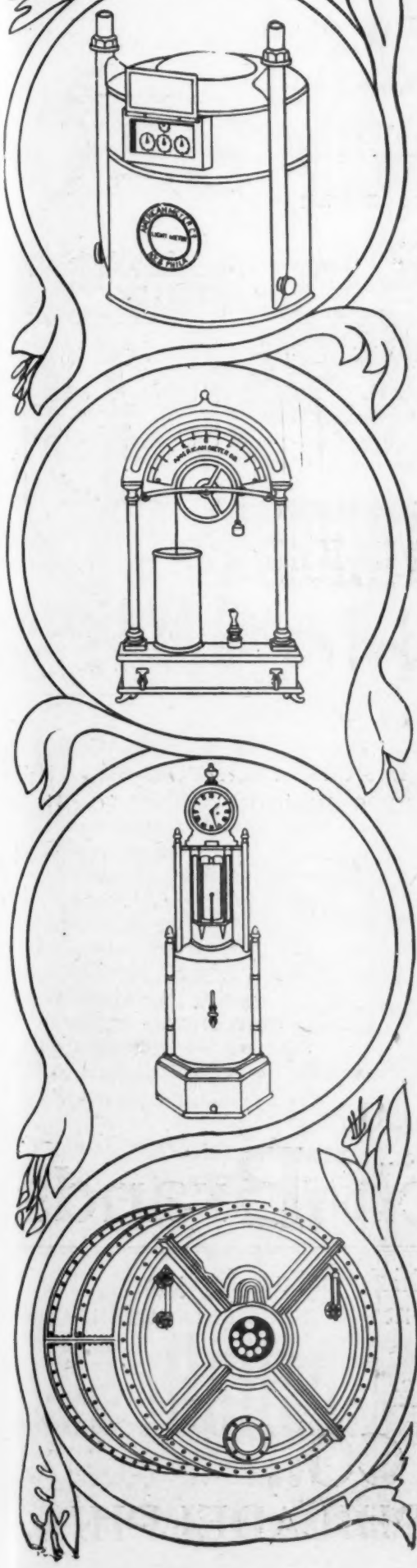
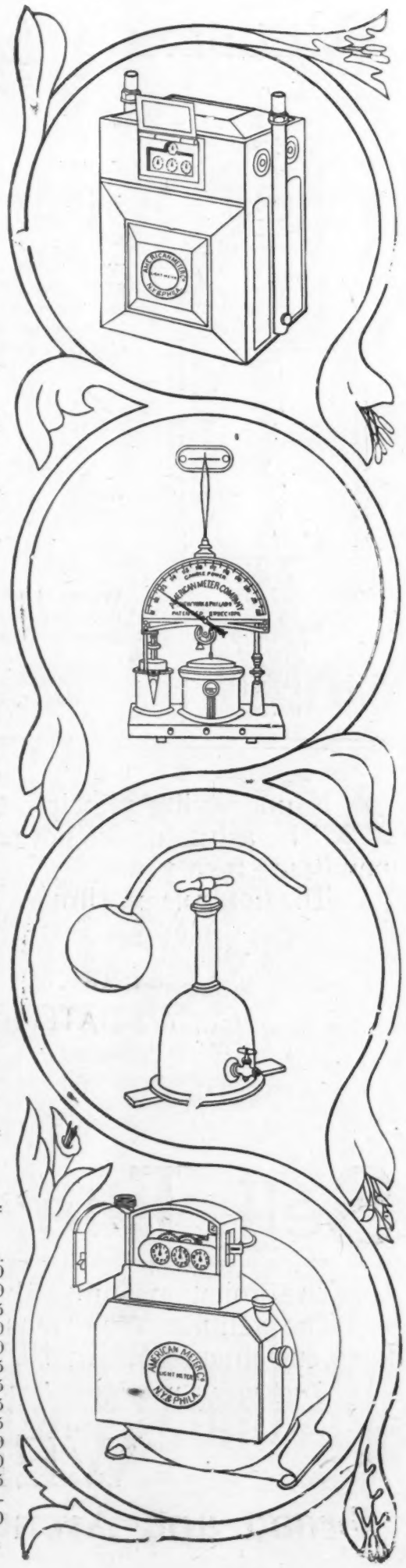




PUBLIC LIGHTING TABLE.

APRIL, 1904.

Day of Week.	Table No. 1. Following the Moon. Date.	Light.	Extinguish.	Table No. 2. New York City. All Night Lighting. Light.	Extinguish.
				P.M.	A.M.
Fri.	1	6.50 PM	9.00 PM	6.10	4.55
Sat.	2	6 50	10.00	6.15	4.40
Sun.	3	7.00	11.10	6.15	4.40
Mon.	4	7.00	12.10 AM	6.15	4.40
Tue.	5	7.00	1.00	6.15	4.40
Wed.	6	7.00	1.50	6.15	4.40
Thu.	7	7.00 LQ	2.30	6.15	4.40
Fri.	8	7.00	3.10	6.15	4.40
Sat.	9	7.00	3.50	6.25	4.30
Sun.	10	7.10	4.20	6.25	4.30
Mon.	11	7.10	4.30	6.25	4.30
Tue.	12	7.10	4.30	6.25	4.30
Wed.	13	7.10	4.30	6.25	4.30
Thu.	14	7.10	4.30	6.25	4.30
Fri.	15	7.10 NM	4.30	6.25	4.30
Sat.	16	7.10	4.30	6.30	4.20
Sun.	17	7.10	4.20	6.30	4.20
Mon.	18	7.10	4.20	6.30	4.20
Tue.	19	7.10	4.20	6.30	4.20
Wed.	20	10.30	4.20	6.30	4 20
Thu.	21	11.20	4.20	6.30	4.20
Fri.	22	12.10 AM FQ	4.20	6.30	4.20
Sat.	23	12.50	4.20	6.40	4.10
Sun.	24	1.30	4.10	6.40	4.10
Mon.	25	2.10	4.10	6.40	4.10
Tue.	26	2.50	4.10	6.40	4.10
Wed.	27	3.30	4.10	6.40	4.10
Thu.	28	No L.	No L.	6.40	4.10
Fri.	29	No L. FM	No L.	6.40	4.10
Sat.	30	No L.	No L.	6.45	4.00

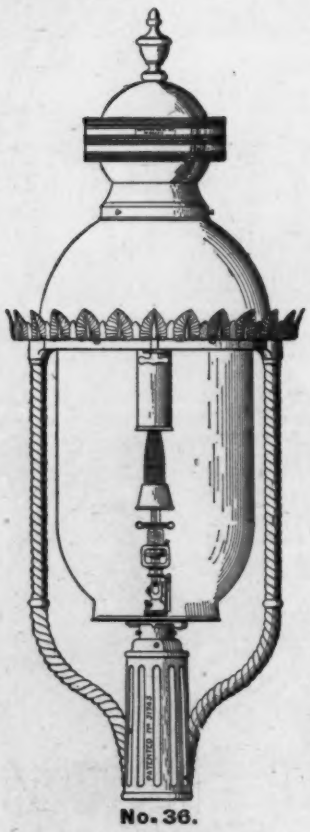
TOTAL HOURS LIGHTING DURING 1904.

By Table No. 1.	Hrs.Min.	By Table No. 2.	Hrs.Min.
January	225.00	January	423.20
February	205.40	February	367.40
March	187.40	March	355.35
April	169.50	April	298.50
May	152.30	May	264.50
June	137.20	June	234.25
July	138.50	July	243.45
August	151.00	August	280.25
September	164.40	September	321.15
October	191.30	October	374.30
November	210.30	November	401.40
December	237.10	December	433.45
Total, yr.	2171.40	Total, yr.	4000.00

NEW YORK, 33 Nassau Street. BOSTON, 814 Beacon Building. PHILADELPHIA, Broad and Arch Streets. ST. LOUIS, 712 Roe Building. CHICAGO, Foot of Orleans Street. SAN FRANCISCO, 712 Polk Street.

WELSBACH STREET LIGHTING COMPANY

.... OF AMERICA ....



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POINTS OF MERIT:

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IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.

Correspondence Solicited from Gas Companies and Others interested in Municipal and Outside Lighting.

No. 38.

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The formula is simple-

THIS SHIELD IS THE WELSBACH TRADE MARK.

IT IS A GUARANTEE AND A PROTECTION.

Sell The Welsbach Brands.

The imitation stuff is bad for the customer---which is bad for you.

The genuine Welsbachs---Burners or Mantles---make satisfied customers---keep customers---MAKE NEW ONES.

And your profit isn't merely dollars and cents.

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For the Year Ending December 31, 1903, has been Awarded Contracts in the Following Places for

Standard Double-Superheater Lowe Water Gas Apparatus.

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Chicago, Ills.	Newark, N. J.	Cicero, Ills.
Amesbury, Mass.	Washington, D. C.	Chicago (Ogden Co.)
Aberdeen, S. D.	Boone, Ia.	Easton, Pa.
Winsted, Conn.	Pueblo, Col.	Lawrence, Mass.
Canon City, Col.	Charlotte, N. C.	Council Bluffs, Ia.
Schenectady, N. Y.	Fall River, Mass.	Chattanooga, Tenn.
Hagerstown, Md.	Duluth, Minn.	Tuckerton, N. J.
Malden, Mass.	New York (Mutual Co.)	Springfield, O.
Bridgeport, Conn.	Waltham, Mass.	Easton, Pa. (2d contract).
Albert Lea, Minn.	Dover, Del.	Mobile, Ala.
Brooklyn, N. Y.	York, Pa.	Conshohocken, Pa.
Kansas City, Kas.	Minneapolis, Minn.	Mason City, Ia.
Hempstead, N. Y.	Allentown, Pa.	

TOTAL SETS FOR 1903, ... 62
TOTAL DAILY CAPACITY, ... 62,950,000 cubic feet.
TOTAL SETS TO DATE, ... 508
TOTAL DAILY CAPACITY, ... 362,780,000 cubic feet.

The United Gas Improvement Company,

Broad and Arch Streets, Philadelphia.

Established 1858. Incorporated 1890.
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FIRE BRICK, FIRE CLAY, AND FIRE CEMENT.

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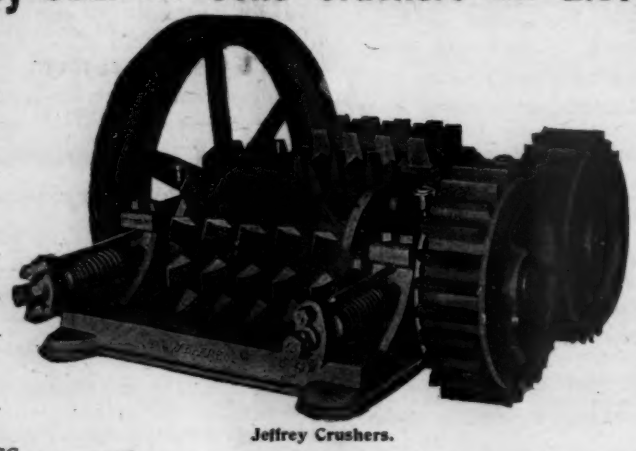

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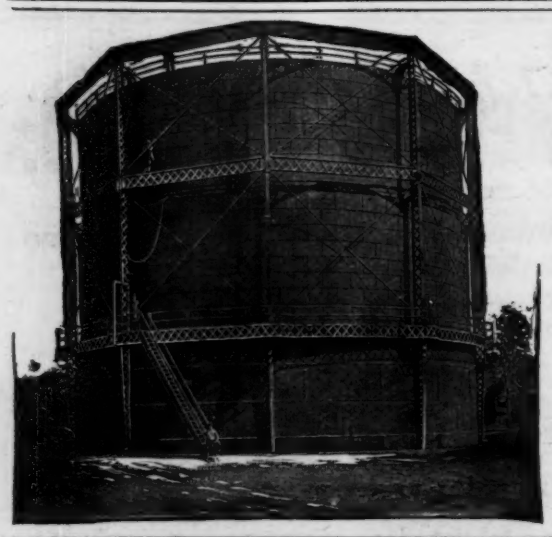

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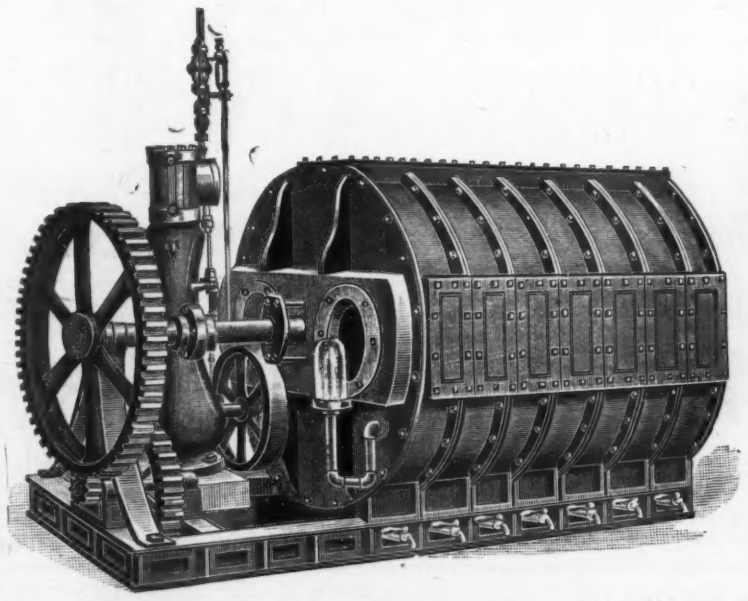

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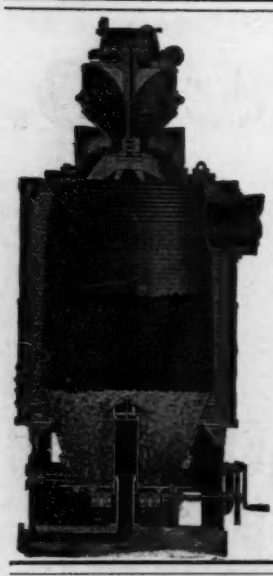

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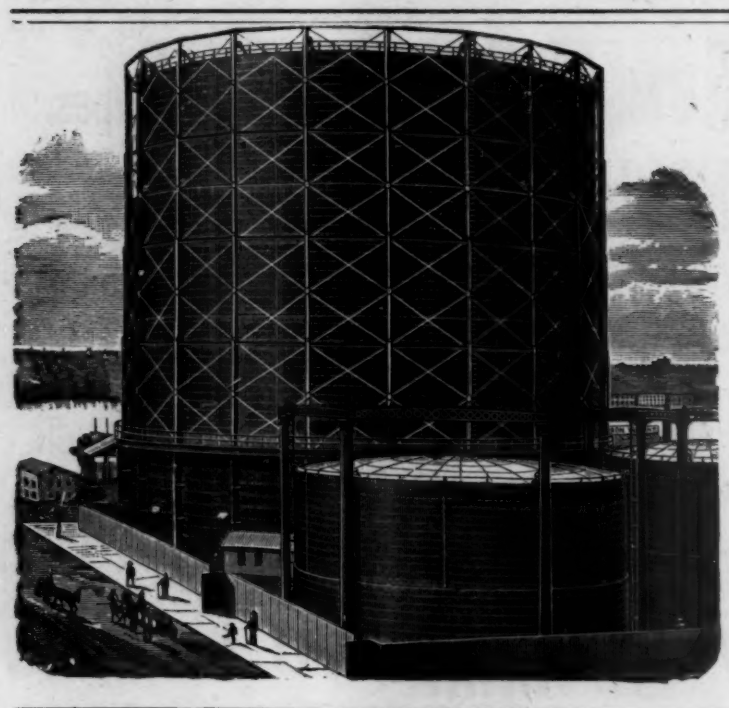

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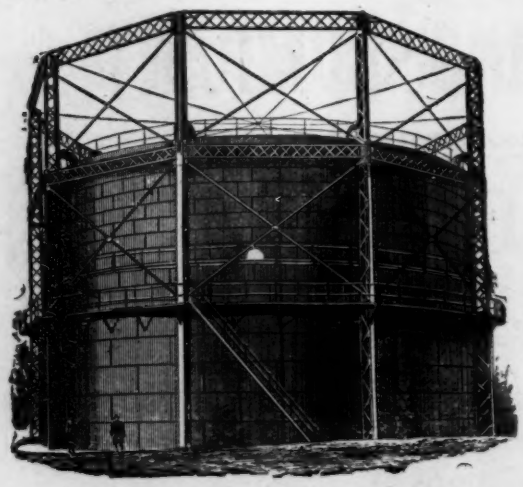

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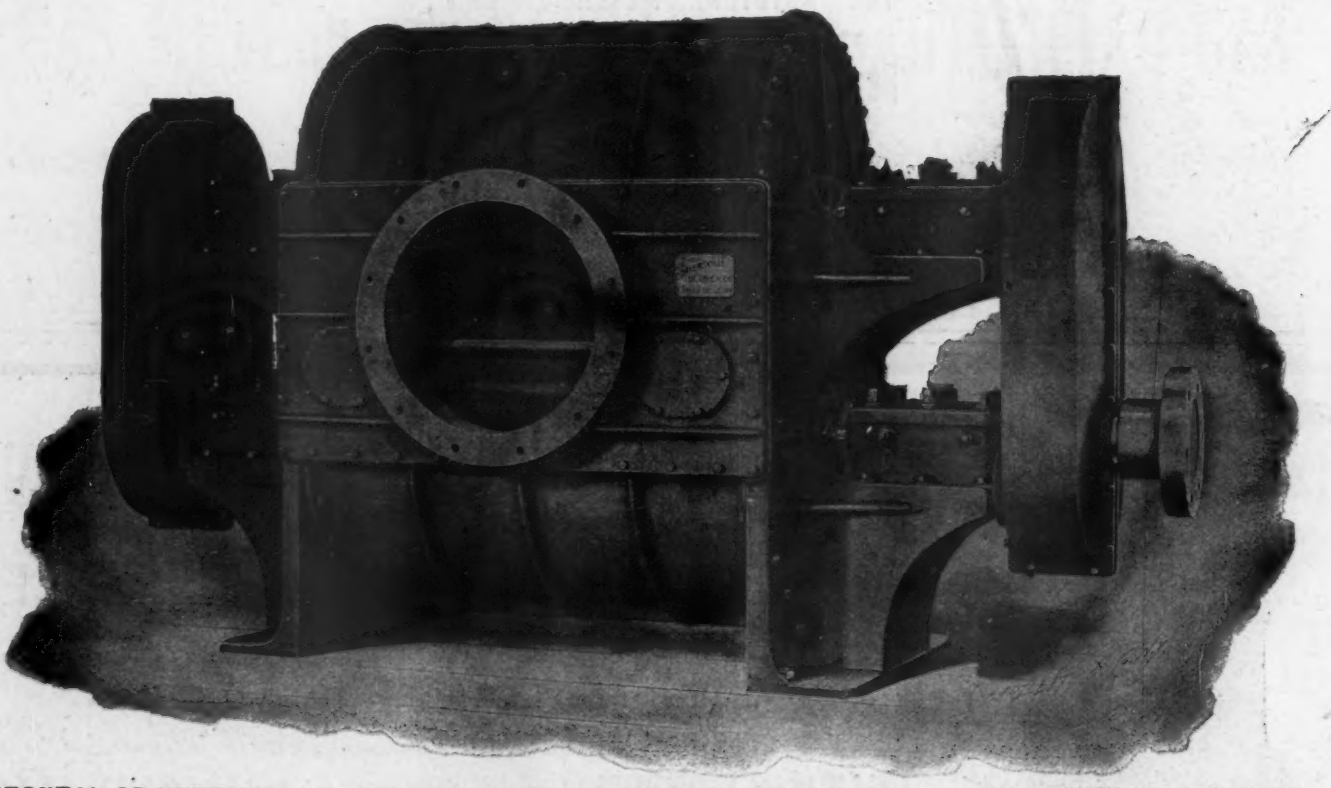

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